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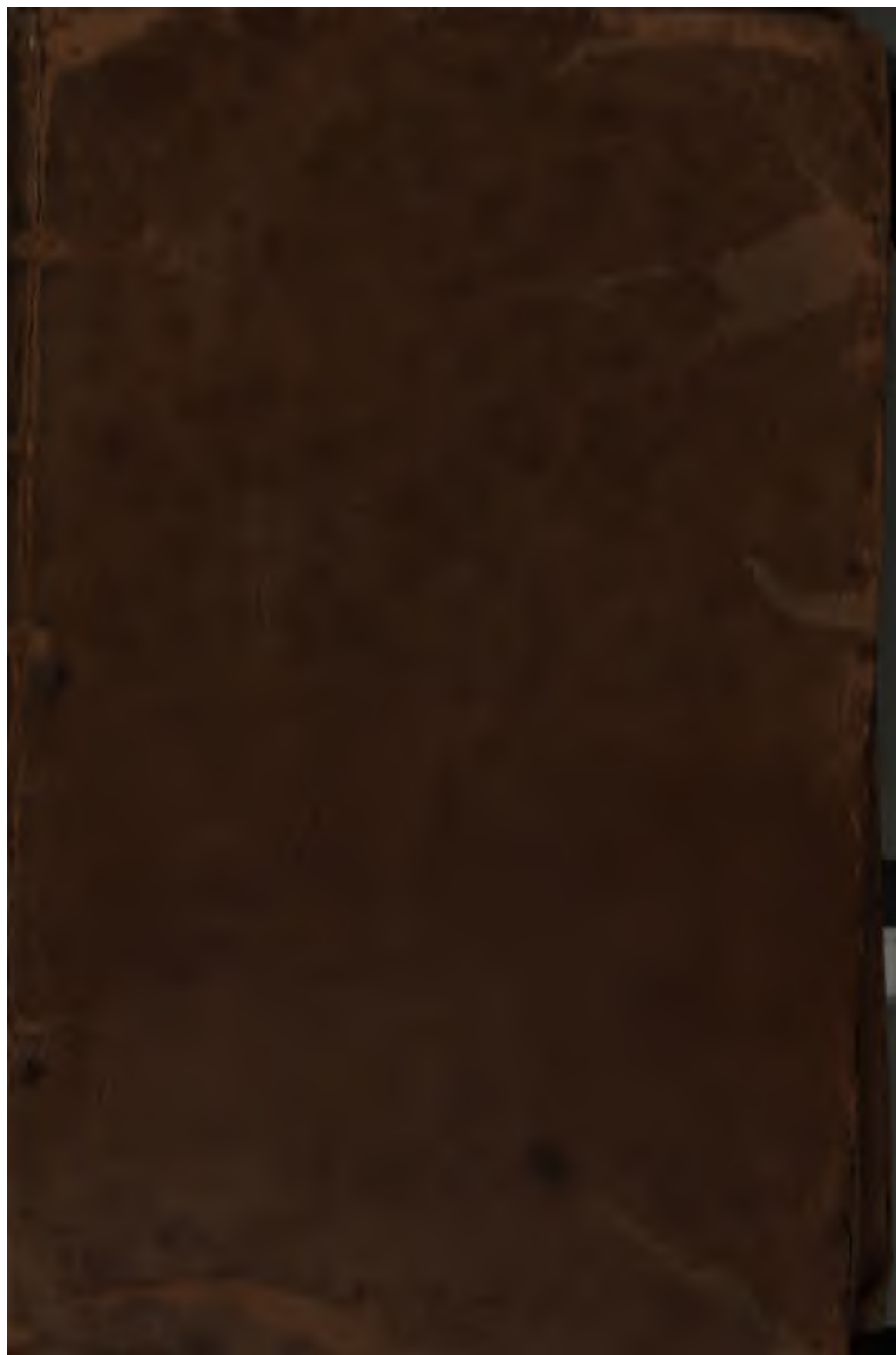
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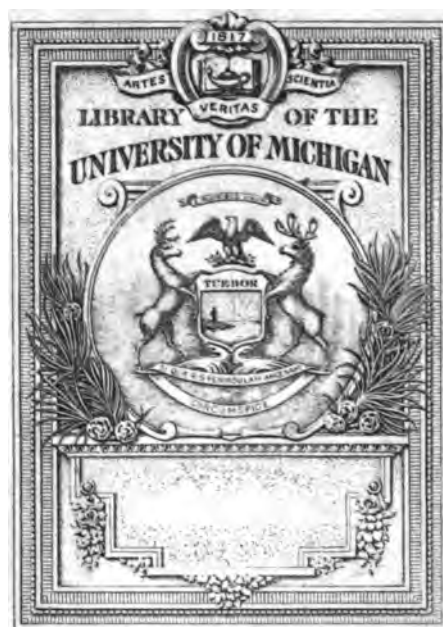
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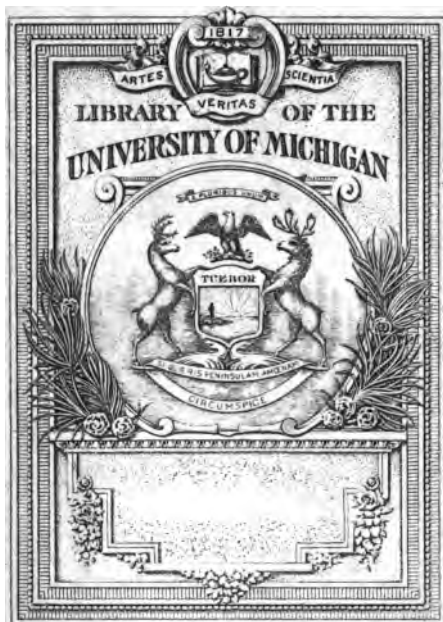


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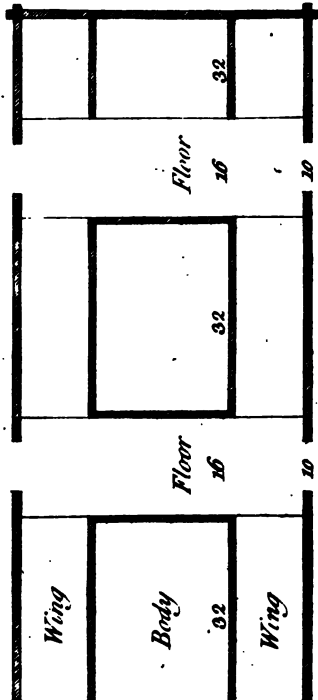


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MDCCLXXI.

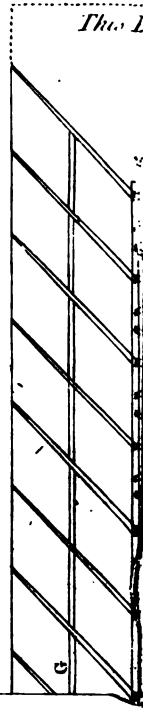


Rick Yard for Corn



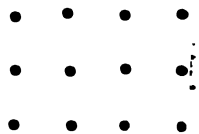
Passage to Rick Yard

Ground Plan Fig. II. of the Barn



The L

Cart Lodge



Henry, Raven

THE
Complete ENGLISH FARMER,
OR,
A Practical SYSTEM of HUSBANDRY,
FOUNDED UPON
Natural, certain, and obvious PRINCIPLES:
In which is comprized,
A General View of the whole ART of AGRICULTURE,
EXHIBITING
The different Effects of cultivating LAND,
According to the Usage
Of the OLD and NEW HUSBANDRY.

THE WHOLE

Exemplified by a Series of suitable Management from the first Apportionment of a FARM from the Waste; to the Time of perfecting it by proper Cultivation in every Part:

To which are added,

Particular Directions for the Culture of every Species of GRAIN in common Use. And a new Method of TILLAGE recommended, partaking of the Simplicity of the OLD HUSBANDRY, and of all the Advantages of the NEW.

ILLUSTRATED

With PLANS of the necessary BUILDINGS belonging to a FARM HOUSE; and an attempt to establish a Rule for constructing BARNs, which may be applied to all Dimensions; also, accurate Delineations of some newly-invented FARMING INSTRUMENTS.

By a PRACTICAL FARMER,
And a FRIEND of the late Mr. JETHRO TULL,
Author of the Horse-hoeing Husbandry.

L O N D O N :

Printed for F. NEWBERRY, the Corner of St. Paul's-Church-Yard.

MDCCLXXI.

ed in the estimation of the practisers, and that Book-Husbandry among farmers is held in the utmost contempt. It is an observation that, I believe, will hold universally, that whenever a gentleman enters upon farming with a resolution to model his practice by the instructions he may have received from books, the neighbouring farmers, with their usual sagacity, conclude, *that if his fortune is but small, Maister is in the road to ruin it.*

But, surely, something may be done to rescue Book-Husbandry from that contempt into which it is fallen. Unfortunately for farming, the greatest number of those who have pretended to teach the art, have either been scholars only, or unlearned farmers; either mere theorists* or mere practisers; the former have been too prone to advance novelties, and to adopt the subtilties of abstruse reasoning to support their reveries; the latter too ignorant to reason from effects to causes, and therefore

* From this general censure some modern writers are to be exempted, among whom my late ingenious friend Mr. Jethro Tull, whose book, were it to be properly revised, no lover of agriculture should be without; and the present laborious Arthur Young, Esq; whose writings are full of practical knowledge as well as just reasoning, and deserve the greatest encouragement. The author of the elegant Essay on Husbandry, the Rev. Mr. Walter Hart, is likewise an exception, and may be numbered among the practical writers who by their learning have done honour to the science. There are likewise many other gentlemen who have written with great knowledge on the culture of particular plants; to whom I acknowledge myself indebted for many excellent observations that will be found interspersed thro' the following little work; but no writer that I have yet met with, has taken the pains to bring the business of farming into one connected view.

P R E F A C E.

ready upon all occasions to refer us to the experience of ordinary practice for the evidence of principles which they have known no other method to establish.

Of the two, the latter is, perhaps, the most worthy to be regarded. He who endeavours to recommend to the farmer's practice a method of cultivation founded only upon an illusive theory, tho' supported by the most plausible deductions, will be much more likely to lead him into error, than the man who by the observation of what has happened to himself and others from one uniform method of practice, ventures to pronounce that the like will happen to all, if all in like circumstances will be persuaded to pursue the same track.

Indeed if we consider farming as an ART, there seems a necessity to adopt some known theory, or to advance some new hypothesis, to which, as a late author observes, reference may be made, and from which we may proceed in a regular manner to consider its connexions and dependencies, and at last to sum up the whole, in order to form one general conclusion.

The only theory of husbandry that has hitherto received the sanction of modern approbation, is that of the celebrated Jethro Tull, Esq; That masterly writer, supposes roots to be the organs ordained by nature to collect food for the maintenance of plants; that roots, by being broken off near the ends encrease the number

of their fibres, and by consequence encrease the supply of food ; that leaves are necessary to the life of plants, as lungs are necessary to the life of animals ; that the food of plants, is *earth impregnated with a due proportion of the other elements* ; that the pasture of plants is the internal superficies of the earth, in like manner as the external superficies serves for the pasture of animals ; that this internal superficies may be increased *ad infinitum*, by dividing and attenuating the soil ; and that in proportion as it is increased, the food of plants is increased also ; that the only means of increasing the internal superficies is by dividing its parts ; that the instruments for that purpose are dung and tillage ; that the chief and almost only use of dung is to divide and attenuate, and can no otherwise be said to assist in nourishing plants than as a knife may be said to nourish a man by preparing his meat ; and that the whole art of husbandry is, *to provide food for plants* by attenuating, dividing, and pulverising the soil.

This is the theory on which Mr. Tull has founded his celebrated system of horse-hoeing husbandry, by a due attention to which, imperfect as by some it is represented to be, the art may be practised with as much certainty as the nature of an art depending upon innumerable contingencies will admit. The complaint therefore that this art has been neglected, while other arts have received considerable improvement, does not seem to me to be well found-

founded. Can the art of navigation be said to be imperfect when storms, and hurricanes drive the mariner out of his course? in like manner can the art of husbandry be said to be imperfect, when unfavourable seasons deprive the husbandman of his crop? One would think that the general plenty that often attends the ordinary course of cultivation would inspire men with other notions, and instead of imputing the failure that sometimes happens, to a defect of the art, might lead them to look up to a higher cause, and to acknowledge, that tho' *Paul may sow, and Apollos may water, yet the increase descends from above.*

Among the learned of the present times, there is one high in the estimation of his countrymen, who has condescended to make the improvement of agriculture a part of his study. This gentleman, disliking the Tullian theory, and alike contemning the ordinary practice of farmers, because founded on no certain principles, nor governed by any settled rules, has attempted by a plausible series of chemical experiments to develope the true principles of the art, and by analogy to establish a system of agriculture more uniform in its effects, and more certain in the practice than what the succession of ages had before been able to produce.

From these experiments, however, little advantage has accrued to husbandry. It was before known to the husbandman without the aid

aid of chemistry, that certain mixtures were necessary in the course of regular practice, to quicken and promote vegetation; that those mixtures, if duly prepared, had ever that effect; that some mixtures were indeed hurtful to some plants; and that a few were fatal. The qualities, however, of all the usual mixtures have long been known to the husbandman, and there has not one species of manure been added to the Farmer's Catalogue, from the days of Hartlib, to the days of Dr. Home, unless *oil of olives*, * *spirit of hartshorn*, and *flower of brimstone*, are to be ranked among the number.

It were impertinent to swell the preface to a small book, with a recapitulation of all the chemical experiments and physical disquisitions that have been introduced into husbandry, with a view only to the support of some favourite hypothesis; yet it may be so far necessary to consider the leading principles, as to confirm their truth, or to expose their error.

Mr. Tull, who has comprised the whole art of Husbandry in one single aphorism PROVIDING FOR THE FOOD OF PLANTS, has not left that food, like Plat and other mystical writers, for the farmer's ingenuity to discover, but after considering all that had been said by the most celebrated writers on the subject, concludes with this syllogism, that what nourishes and augments a plant, must be the

* See Dr. Home's principles of agriculture, &c. p. 98.
food

food of it: earth nourishes and augments a plant, therefore earth is the true food of it. He does not, however, as has been imputed to him, exclude a proportionable share of the other elements, but supposes *nitre, water, air, and fire*, to be included in that earth that gives life and magnitude to plants. In this, however, he is opposed by Dr. Home, for no other reason, as it should seem, but because Mr. Tull was no chemist. The Doctor's words are remarkable.† “ Some modern philosophical chemists, says he, “ such as Eller and Euler, are of opinion that water is the “ nourishment of plants; others think that “ the more ~~more~~terrene particles are those which “ nourish plants. Of this opinion is the famous Tull, *because, says he, earth augments them, and whatsoever augments them must be their food. Dung and other manures act only by fermenting and so attenuating the soil, and are of no more use than as a knife to divide their food.*—But earth alone, continues Dr. Home, could never do without some more *active principles*. Had Tull been a chemist, he would have known that *mere earth* makes but a small part of all plants. Soils may certainly be too loose. To earth already sufficiently attenuated, manures would do no service. *Whence the salts and oil of plants?* These are objections, which the favourers of his [Mr. Tull's] system never can answer.”

† See Dr. Home's principles of agriculture and vegetation; p. 128.

x P R E F A C E.

Will not any one who has not read Mr. Tull's book conclude from the above quotation, that Mr. Tull has asserted that mere earth is the food of plants? but Mr. Tull, as I have already observed in the account I have given of his theory, says no such thing. Mr. Tull, after enumerating the materials that are universally agreed to contribute to the increase of plants, viz. *nitre, water, air, fire, and earth*, proceeds to examine the different opinions of learned men concerning the identical principle of increase, and in preference to the rest, simply and singly considered, ascribes it to earth: but so far is he from asserting that *mere earth* is the sole nourishment of plants, that he has asserted the very contrary; his words are these, "And earth is so surely
 " the food of plants, *that with the PROPER*
 " *SHARE of the other elements which each*
 " *species of plant requires*, I do not find but
 " that any common earth will nourish any
 " plant." What has Dr. Home said more than this, when he asserts that plants are nourished by air, water, EARTH, and salt, in conjunction with oil and fire, but that he has added oil to Mr. Tull's list to make the rest go down the smoother, and substituted salt instead of nitre, but afterwards, throughout his whole reasoning, makes it probable that nitre is the salt he means. "Air, says the Doctor,
 " active and fixed, is to be had every where.
 " Elementary fire is found in all bodies;
 " earth may be supplied by any soil; water
 " drops from the clouds; oil is a natural
 prin-

“ *principle of all earths*, descends with the
 “ rains and snows, and is communicated to
 “ the ground by all the vegetable and animal
 “ manures; but whence the SALT, the most
 “ active and the most necessary principle of
 “ all?”

As the Doctor has already answered in the
 above citation one part of the objection him-
 self, which the favourers of Mr. Tull's sys-
 tem, he asserts, never can answer, namely,
whence the oil? so, in another place he an-
 swers likewise, *whence the salts?* namely,
 “ by boiling the rich earth of a mole-hill in
 “ water, filtering the liquor thro' brown pa-
 “ per, and adding oil of tartar *per deliquium*,
 “ treating it afterwards as manufacturers do
 “ the materials of salt-petre, and adding quick-
 “ lime to separate the oil from the salts.” By
 this process he acknowledges, that he him-
 self got from the earth of a mole-hill a true
 salt-petre, and boasts at the same time, that
 by this experiment he has shewn the saline
 part of the vegetable food to the eye; yet I
 must beg leave to doubt, notwithstanding this
 experimental discovery, whether this *saline*
food adds one single grain to the *substance*, by
 which I mean the *solidity* of the largest tree;
 and till the Doctor can demonstrate that up-
 on the dissolution, or more properly speaking,
 the separation of the parts of plants, either by
 putrefaction, fermentation, or any other natu-
 ral or chemical process, the elementary parts
 exceed the earthy, I shall concluded with
Mr.

Mr. Tull, that earth, with a due proportion of other elements, is the true food of plants.

That the Doctor should so readily find all the other elements, and yet be at a loss for his salts, can no otherwise be accounted for; than from a desire of exalting his own importance, by overthrowing the least exceptionable theory of vegetation and vegetable food that has yet been advanced; in which, however, he has been so very unfortunate, that every experiment he has produced to disprove it, tends ultimately to confirm it.

Had Mr. Tull asserted, what the Doctor assumes he did assert, that *mere earth* was the food of plants, the Doctor has himself furnished an argument in favour even of that assertion, and has accounted upon another occasion and for another purpose for the oils and salts in plants. From an experiment of *Homburg*, he has shewn the power inherent in the vessels of plants, to change to their own nature the substances that are imbibed for their subsistence. “ *Homburg* filled two pots, one with earth mixed with some salt-petre; the other with earth that had all its salts washed out. In the first, he planted *cresses* which is an alcalescent plant, and affords a volatile alkaline salt, but no acid; and in the other, *fennel*, which is an acescent plant, and affords an acid in distillation, and no alkaline volatile salt. The *cresses* in the nitred pot, when distilled, gave no acid salt, tho’ fed on salt which contained an acid. The fennel, fed in the washed earth, gave an acid though there was none in the earth

earth in which it was planted." These experiments shew, that there are in bodies many latent properties equally inscrutable both by the farmer and chemist. Yet I cannot conclude these few observations without taking notice, that if the art of chemistry is already *arrived at perfection*, as the Doctor affirms it is, he must be but a mean proficient, who cannot extract from *any* earth *any* material that may be necessary to confirm *any* hypothesis, which he, the chemist, may have occasion to advance.

These observations, however, are not intended to discountenance the learned of any nation in their endeavours to promote the interests of agriculture, or to interrupt them in the course of their experimental enquiries; neither do I mean to condemn the solicitude of those, who having advanced new notions of their own, or endeavoured to overthrow old systems of others, are powerfully biassed in favour of their own opinions; all I mean is, to assert the cause of truth, and not to suffer the subtleties of living authors to triumph over the sensible productions of those that are dead. Were we to judge of the merits of the two writers by the works in question, Mr. Tull's Horse-hoeing Husbandry, and Dr. Home's Principles of Agriculture and Vegetation, the former exceeds the latter in point of real utility to the farmer, as much as an engine to raise water may be allowed to exceed the contrivance of the channel by which it is carried off. But to proceed.

The

The reader must not expect in a work like this many new discoveries. It is no part of my design to amuse the world with novelties. I am rather inclined to the practice of the *Old Husbandry*, tho' I fully and frankly acquiesce in the principles of the *New*. My reason for this seeming contradiction, is, because I am not without some suspicion that the mighty things which have been said and written of the advantages accruing from the *New*, are deduced from experiments in *small*, or UPON LANDS OF A PECULIAR KIND, and not from a general course of practice *upon lands of all kinds*, confirmed by the experience, of any given number of years. To this, I know, Mr. Tull's own practice of thirteen years will be urged as an exception. I grant it. But gentlemen who have followed Mr. Tull in the practice of this husbandry, and few, I believe, but gentlemen have followed him in the practice of it, being possessed of various soils, may reasonably be supposed to have *generally* made choice of that which was most proper for their purpose, and besides they are not always exact in the estimates of their expences; they do not depend, as common farmers do, for a livelihood, upon the profits of the land they occupy. One farmer growing rich by the sole practice of the *New Husbandry*, would to me be a more convincing proof of its superiority over the *Old*, than a thousand calculations of profit and loss upon paper, than which I know nothing in figures so fallacious. I declare, I know no such gentleman farmer, nor ever heard of such a one;

one; but of two gentlemen of small fortunes I have heard, who hurt themselves by the practice; the one, the late Mr. King of Plaistow in Kent, the other, Mr. Job Coles of Deddington in Oxfordshire; and others there are now living, who are not insensible of the truth of this remark; nay, I have heard it from persons of credit and candour, some of them very nearly related to him, that if Mr. Tull himself who invented the New Husbandry, and practised it with unremitting diligence, had let the farm he occupied to a substantial tenant, he might have lived more genteely upon the rent without labour, than upon the whole produce of it laboriously acquired.

That the destruction of weeds, the multiplying of fibres, and the loosening earth about the roots of plants will increase their vigour, are truths that cannot be controverted; but in this country where labour is dear, the expence of performing these operations, I am inclined to think from my own little experience, will exceed the profit. Will any one who has made the experiment take upon him to say, that in rows only twelve inches a-part, the two inches that are planted will produce an equal quantity of grain, after being three times hand-hoed, with the whole fourteen inches planted in the ordinary manner, provided the land is all equally prepared; with an additional excess that will pay for the excess of labour?

In the horse-hoeing culture, tho' the expence of labour may be less, the waste of land is out of all proportion greater, for there,
only

only *four* inches out of *seventy two* are planted, the remaining sixty eight are left for the introduction of the hoe-plow. And will any one say, that in the nature of things four inches can be made to produce as much grain as *seventy two*, provided the whole seventy two are all in the same heart before planting? From my own experience I am inclined to conclude they will not.

But, say the favourers of this husbandry, it is the uninterrupted succession of crops upon the same land that gives the advantage.— If that, indeed, could be obtained, and the labour remitted, the fact must stand confessed. But five or six plowings, or if you will, horse-hoeings, are necessary in order to the growth of the present, and as a preparation for every succeeding crop; and five or six plowings cannot be performed without a very considerable expence. But this is not all. It is well known to those who are accustomed to the culture of land, that in the intervals of well-cultivated ground, weeds spring up the readiest and thrive the fastest, and that it requires more than ordinary pains to subdue them; that in certain rainy seasons this is impossible; and that in seasons when it is possible, other business will sometimes interfere, so as to make it very inconvenient to catch every opportunity that offers, and yet, if an opportunity is suffered to escape, the lapse is irrecoverable. If such be the critical situation of hoeing, and such it most certainly is in *large concerns*, can it be
sup-

supposed that prudent men will risque the success of their crops upon such uncertainties.

Moreover, in stiff clays, neither the drill nor the horse-hoe can be introduced, generally speaking, to advantage. Land of this stubborn nature can seldom be brought to such a tilth as to admit of either; for land must be made very fine before the most perfect drill-plow that I have ever yet seen, can work with that degree of certainty as is necessary to plant equally the respective rows: and in summer, when the assistance of the horse-hoe is most wanted, such soils are apt, if the weather be dry, to be so hardened as not to be removed without annoyance to the rows; and if wet, clay is so tenacious of rain, and so poachy, that any attempts to loosen the soil in that situation would serve only to compress it. The horse-hoeing husbandry can never therefore be the general husbandry of England, where at least two parts in three of the arable lands are clay.

New methods of husbandry, that are to exclude the old, should have every degree of evidence to support them, that ease in the practice and profit in the issue are capable of producing. They should not only be more simple and more expeditious in the execution, but more certain and more copious in their produce. If upon repeated trials any such new method of husbandry was to be propounded, and if the advantages of it were to be confirmed by the most convincing of all arguments, the enrichment of the practisers, then indeed,

nothing but obstinacy or infatuation could be alledged for not relinquishing the old and embracing the new. But if upon an impartial comparison of the merits of the new husbandry so strongly recommended in books, with those of the old so tenaciously adhered to by the body of farmers, we find the very reverse of this generally the truth, is it to be wondered at, that a sober and sensible set of men should adhere to the solid, approved, and experienced maxims of their fathers; and that they should reject this novel husbandry, and refer it to less experienced undertakers, who like adventurers into new regions, believing the reports of the first discoverers, expect to draw riches from every soil, and make a fortune upon every farm.

But nevertheless, the memory of Mr. Tull ought to be held in the highest reverence by every husbandman, for his improvement of the art of Agriculture. It is from him we have learnt the great benefit of frequent plowings to pulverise the soil, which in some situations supply the place of dung. To him the farmer owes the advantages arising from cleansing and preparing his ground by sowing of turnips, and improving them by hoeing. It was Mr. Tull who first introduced the drilling of pease, beans, vetches, St. Foin, &c. into field culture, and shewed the advantages of hoeing and keeping them clear from weeds; and it is from him that the whole kingdom have learnt to raise more corn from less seed than ever was thought possible before he set the example.

These

These are solid and substantial advantages, which have introduced an universal reform in husbandry, tho' his method of adapting his own practice to his own principles has not generally obtained.

In the perusal of the following sheets the reader will find nothing repugnant to, or incompatible with the principles by which Mr. Tull has endeavoured to establish his system. I have only endeavoured to combat his method of application, and by a more familiar agency to account for all the phenomena which usually occur in the course of the husbandman's practice, and to assist him in the ordinary and regular pursuit of his art by directing his attention to those objects that are most worthy of his consideration.

Heat and moisture, according to my observation, are the grand agents by which the work of vegetation is carried on, and on a judicious adjustment of these, as nature has in many instances set the example, the chief art of husbandry seems to depend. The temperature of the fertile earth that in many places abound, is a patern to which the curious cultivator should always have an eye in the management of his land. This earth dug by the spade, or turned up by the plough is always in a crumbly state, always has a moisture, but is never wet; no sun can make it too hot in its natural bed, nor any frost make it too cold. As fertility is the certain and indubitable property of this temperature, is not this a plain and simple rule for the farmer to proceed by

in the preparation of his land. What has he more to do with land naturally cold, and from that quality sterile, but to reduce it to this temper, in order to make it fertile; or with land naturally hot, and from that quality barren, but to moderate its heat by a proportionable quantity of some cold mixture. But, says the husbandman all this we know, but how is it to be accomplished? the answer is, by attending to the properties of bodies which nature has provided on purpose for the exercise of man's ingenuity in the improvement of the soil.

By attentive observation men have discovered in bodies seemingly cold, the latent principles of fire. Chalk is a striking demonstration of this truth. Tho' it appears wet, cold, and hard when in its natural bed, yet when exposed to the air, it becomes dry and warm; when calcined in the fire it assumes another quality, and mingled with water, its fiery particles absorb moisture with such astonishing rapidity as to produce all the effects of actual fire. Fossil and calcarious bodies produce in like circumstances, the like effects. Does not this lead to their use in the management of land? Does it not plainly, as with the finger of wisdom, point out, that by a proper mixture of these bodies with cold land, the wet will be absorbed, and the remaining mass warmed!

Chemistry has, indeed, discovered the wonderful effects of the mixture of bodies seemingly cold. An easy experiment, within every ones reach will ascertain the fact. Take of
fine

fine flower and powdered allum, of each equal parts, mix them well together and put the mixture into a phial. Stop the phial close with a glass stopper, and put it into a crucible, cover it with charcoal ignited, and when it is red hot, take it out, and let it gradually cool. Expose this mixture at any future time to the air by taking out the stopper, and it will instantly exhibit an actual fire. From this simple experiment we may learn how much depends upon the happy mixture of bodies in the process of vegetation.—But to proceed.

Clay, in opposition to chalk, is of a nature altogether cold and gummy when in its natural bed, expose it to the action of the sun and it becomes hard and dry; expose it to the winter's frost, and it becomes a fine moist powder; cover it again from the immediate action of the air, and it again assumes its natural property of coldness and tenacity. Does not this demonstrate, that a mixture of this substance with hot and dry earth will bring both to a proper temperament.

Every man, I believe, must have observed, that *heat* and *moisture* are the great instruments of vegetation; that they act uniformly in conjunction; that heat without moisture will kill the most vigorous plant, and that in moisture without heat no plant can live; that by heat natural or acquired, moisture is rendered active; that by moisture duly proportioned heat is increased; and that by a just apportionment of these two principles, in conjunction with the natural sympathies of bodies, aided

by the friendly influences of the sun and other elements, the whole œconomy of vegetable life is invariably carried on and continued. If this be admitted, it will follow, as I have already observed, that the chief art of the husbandman must consist in bringing his land to a proper temperament with regard to heat and moisture; and that I may be clearly understood, it will be necessary that I should explain what is here meant by these two powerful agents.

By *heat*, therefore, I mean that principle produced by the intestine motion of bodies, which, while it remains moderate, takes the name of *heat*; but when violently agitated, is called fire. This principle is to be generated by the mixture of bodies of various kinds, of which dung in agriculture is a powerful ingredient.

By *moisture* I would be understood to mean that humidity which remains in the earth after the rains and snows have been filtrated thro' its pores. It is from this moisture that, in my opinion, the food of plants is supplied, and in this moisture, it is more than probable, that all the elementary parts of plants are contained. It is, therefore, in proportion to the richness of this moisture that the earth is found to be more or less fertile; and it may be asserted in support of this hypothesis, as a thousand instances might be adduced to prove it, that this mixture cannot be enriched without a genial warmth immediately succeeding.

It may perhaps, be objected that some land is so circumstanced that no art can change its

nature ; this I deny. Those lands that are by nature boggy or mirey, may by labour and proper management be made warm and moist. Moors, which are the most stubborn, and yield the slowest to the husbandman's correction, may yet be reduced to a proper temperature, of which the ingenious Mr. Young in his North Tour has given more instances than one ; and I myself have seen as fine grass on a piece of that kind of land, well drained and properly managed, as ever I saw on the best meadow.—But more of this in its place.

Before I conclude this preface, it may be necessary to acquaint the reader more precisely with the plan that I have pursued in the prosecution of the following work, which I have divided into two parts.

In the first part I have proceeded upon a supposition that 500 acres of land were to be selected from the waste, and converted into a farm, with house, barns, stables, and all other necessary requisites to be erected upon it. In this view I have endeavoured to establish rules for adjusting the erections to the quantity of land to be inclosed ; and I have not only given directions for properly placing those erections, but likewise for constructing every part of them in the most substantial manner ; and also for dividing, fencing, planting, stocking, breaking up, cropping, and otherwise managing the various matters belonging to the farm till the whole is brought into complete order. This I judged the most eligible method of bringing the whole profession of practical
farm-

farming into a regular series. I am sensible that in the execution many things necessary to be done, and which will occur in every man's practice, have been omitted; I am sensible of many errors as well as many defects, but at the same time I am not without hopes, that the outlines are strikingly marked, and that from age and experience, a safe track is pointed out, which it will be no discredit for the unpractised farmer to follow. With regard to the ancient sages of the profession, they have not their lesson to learn from books—their knowledge hath its foundation in labour, and their wisdom remaineth with them.

In the second part, I have treated distinctly of the various species of grain and plants that are generally among farmers, the articles of field culture, in which number I have included all that the Honourable Society of Arts have made the objects of their particular attention. In discoursing of these, I have considered the properties of plants, pointed out their varieties, their uses, the different methods of culture, the diseases to which they are most subject, and the cure. In all which I have followed the best authorities where my own experience has failed me, and without vanity I may affirm, that I have spared no pains to acquire a thorough knowledge of the subjects of which I have treated, and have used no reserve in communicating that knowledge to the public.

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Pref. p. xviii. l. 8. from the bottom, for *boeing*, r. horse-hoeing. p. xxi. l. 14. for *gummy*, r. clammy, ib. l. 16. for *hard add* dry, r. dry and crumbly, p. xxii. l. 5. from the bottom, for *mixture*, r. moisture.

Page 25. l. 11. from the bottom, for 70, r. 60. p. 26. l. 1. for 70, r. 60. p. 30. l. 2. from the bottom, for 70, r. 60. p. 32. l. 7. for *on by*, r. only. p. 45. l. 3. from the bottom, for 184, r. 144. l. 2. from ditto, for 30, r. 24. p. 55. for 3196. 175. r. 281-15, ib. correct the whole estimate. p. 59. l. 8. for *loft* crop, r. lent crop. p. 79. l. 5. after west country *add* sheep, ib. l. 12. for *on sequence*, r. consequence. p. 89. l. 8. from bottom, for *clay lands*, r. chalky clads. p. 102. l. 3. *dele* and an half. p. 146. l. 8. for *Clower*, r. St. Foin. p. 169. l. 3. from bottom, for 25, r. 13, for 10, r. 28. p. 317. l. 1. after St. Foin *add* seed, ib. l. 4. for *slate*, r. slate. p. 322. l. last, for 13, r. 30. p. 324. l. 9. for *dug*, r. dung. p. 339. l. 1. for *wood*, r. woad. p. 334. l. 8. from bottom, for *cella* r. cellulated. p. 359. l. 6. from bottom, for *are*, r. an. p. 363. l. 1. for *arise*, r. arrive. Other errors of the press of less moment the candid reader is desired to correct as they occur occa- sionally.

INSTRUMENTS OF HUSBANDRY

Invented or improved by the AUTHOR.

Fig. 1. is the Kentish turn-ridge plough, reduced from a plough of the heaviest and most complicated kind, to one of the lightest and simplest construction that has yet been made. It consists only of a beam, a pair of flints, a chiep, or share-tail, a sheat, a pair of binders, which meet in a point before the sheat to cut the ground, as represented in the plate, a chisel-pointed share, a coulter, a moveable mold-boards (*b*) to turn the furrow, and a regulator (*a*) to shift the coulter. This plough cuts the furrows level, and on hilly or stony land is the handiest plough that can be used.

Fig. 2. is the common swing-plough improved, in such a manner, that two horses will do the work of four. The only alteration that is made in it is by introducing two small wheels, on which, and on the point of the share, the plough when on level ground just rests. The intermediate space between the wheels is hollow'd away on the land-side, and likewise underneath, by which contrivance the friction is lessened at least one half, and the plough is proportionably lightened. In every other respect it is constructed on the principle of the common swing-plough.

Fig. 3. is a ridging-plough. It was originally constructed for planting of wheat on ridges in wetish cold land, with a view to lie dry in the winter, and to be hand-hoed in the summer, but upon trial the practice was found too expensive; and it has since been used for ridging up-land in the winter-fallowing, in the same manner, as gardeners trench up their ground for early planting in the spring. It has a flat double-finned share, a double mold-board, so contrived as to throw up the ground from the bottom of the furrows to terminate in a point a-top. The land should be well pulverised with the common plough before this is used.

Fig. 4. is a hand-hoe, the sole invention of the Author. It consists of a kind of double cutting knife, terminating in a point, from the heels of which rise two strong sockets in an angle of forty-five deg. Into these are inserted two strong ash handles, in the manner represented, in the plate; and between them a wheel twenty inches in diameter. With this hoe, in well pulverised land, where the grain is planted in rows, and the hoe proportioned to the distance between them, a man will hoe an acre and a half a day, with as much ease as half an acre with the common hoe.

Fig. 5.

Fig. 5. is a harrow or drag, so contrived as to cut the ground in a rectilinear direction, as represented by the dotted lines in the plate. It was devised for two purposes. The *first*, to serve the purpose of cross-plowing; the other to draw out the strings of quitch. The tines, or coulter are inserted inclining forwards, are ten inches deep beneath the frame, with sharpe edges, and thick backs; for the *first* purpose they are made plain; but for the *second* are bearded at the depth of seven inches. They are made to be changed, being key'd a-top. The harrow is five feet wide at the base, and may be fitted with a number of tines, so as to cut every inch of ground. Where the ground is stiff it should be fitted with handles to keep it steady.

Besides the above instruments, the Author has in his possession a drill-plough of a new construction, more perfect he flatters himself than any that has yet been exhibited. By a very simple movement it drills from a clover-seed to the largest pea, and that with the utmost nicety, never arches, nor bruises the seed, nor is it liable to be put into disorder by striking against stones, or other common accidents. It sows three rows at twelve inches a-part; but may be made to sow as many or as few as the planter pleases. It drills, sows, and harrows at the same time, and were it only used to sow in order to save seed might be drawn by an ordinary man. A poney will now work it to the utmost perfection.

It will in a short time be proposed to the public on very moderate terms.

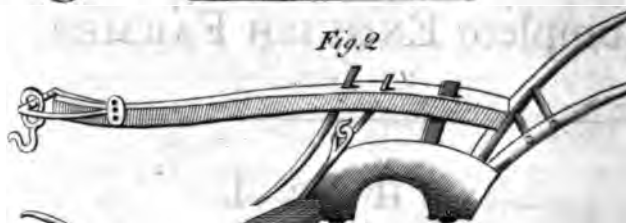
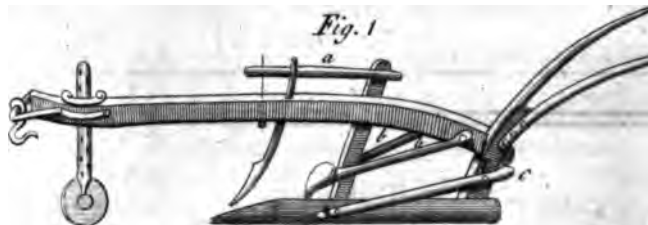
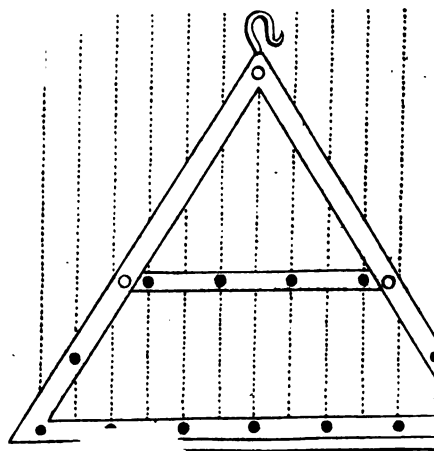


Fig. 4



T H E

Complete ENGLISH FARMER.

C H A P. I.

Of Inclosing, Fencing, and Planting a New Farm.

WHEN any portion of land is to be taken from the waste, to be inclosed and converted into a farm, the most eligible form, where the ground will allow of it, is that of an exact square. The square streight-lined form is the most commodious for a farm, and least expensive.

Commodious, as best adapted to the purposes of ploughing, and as the distance from the extremities to any given point near the center is shorter and more regular than in any other streight-lin'd form.

Least expensive, as the quantity of fencing necessary to inclose it is thereby reduced.

Four lines of 1550 yards each, equal to 6200 yards of fencing, meeting at right angles, will inclose an area of almost 500 acres of land; but two lines of 2500 yards each, and two lines of 600 yards each, equal likewise to 6200 yards of fencing, meeting at right angles, will inclose little more than half the quantity.

As fencing, therefore, is a considerable part of the expence of inclosing land, particular attention should be paid to the manner of setting new farms out,

2 *Of Inclosing, Fencing, and Planting.*

which is the first consideration of consequence that occurs in apportioning farms from the waste.

The next thing that demands attention, is, the manner of fencing; which, tho' very chargeable, is yet so essential a part of inclosing, that to perform it superficially, is to deceive the land owner, and to hurt the tenant at the same time. A good ditch and bank, where less expensive and more effectual defences cannot be raised, should bound new farms on every side. This ditch should be six feet wide at its opening, four feet deep, and not more than one foot wide at bottom; should be dug early in the summer; and should be sloped equally on both sides. The earth thrown out of this ditch should be banked up, and faced on the inside of the inclosure, by means of the upper turf, and should be raised to such a height, that the slope from the bottom of the ditch to the top of the bank, should measure at least seven feet. The top of the bank should then be nicely levelled to the breadth of two feet, and at the proper season of the year planted with three rows of black or white thorn, after this manner which will form, with proper care, the speediest and most durable fence, next to stone, brick, or sod walls, that can be devised.

In Gloucestershire and Worcestershire, where large tracts of waste lands are now enclosing, fencing is there carried on in two very different methods, neither of which in my opinion is the most effectual or least expensive; the first, is, by digging stones, which in that part of the country every where abound, loading them in carts or on wheel barrows, and shooting them in lines; where they are afterwards erected into walls without cement, and extended for miles without any defence. This subjects them to many accidents, and it is no uncommon thing to see breaches in them of very considerable extent, by which means they

they cease to be a security, and are for ever wanting repairs.

Their second method of fencing, is, by making a kind of gutter on each side, and throwing the earth up in the middle, which rises and forms a ridge about thirty inches high. About six inches above the base of this ridge they plant one row of quick, and about a foot above that, they plant a second row; and over all, the loose earth from the gutters on each side is thrown a-top, and thus their fence is completed. To defend the new-planted quick, posts and rails are set up on one side, and a sort of clumsy slit-gates are staked upon the other. To this method of securing the quick, I have no other objection, except the expence of it; but against the manner of planting the quick, much may be urged. Quick loves a rich, moist, loamy soil, neither too wet nor too dry, and as its roots never descend deep in search of nourishment, it feeds only on the rich pasture near the surface, and the richer and more enlarged that surface is, the better it thrives; but by cutting a gutter on each side, they narrow its bounds, and by forming the earth on which it is planted into a ridge, they make way for that moisture by which it is sustained to drain off; so that though it may seem to thrive for a few years at first, it will certainly dwindle, and never arrive at its proper growth.

Let me, therefore, prevail upon some of the liberal minded gentlemen, who may have an interest in inclosures upon the wolds, to make trial of a very simple and very natural method of fencing, that appears to me every way suitable to the nature of the soil and the genius of the country; it is this, to form their fences of sods or turf only, which in time, if properly raised, will so grow and incorporate together, that nothing but main force will demolish them. The construction is easy, as the fence is simple.

4 *Of Inclosing, Fencing, and Planting.*

The method of paring the surface is well known and daily practised in that part of the country; but it might be much more readily performed by means of a plough; in either way, the portion of ground allotted for the fence must be marked out, and the upper surface pared off. The bed of the fence must then be made bare, and a number of men (six at least) engaged to perform the different parts of the work; two of whom are to be employed, one opposite to the other, to lay the turf and build the wall; two in the same manner to fill inn the loose earth and level the courses, and two to wheel the turf to the builders; the method of laying the courses differs but little from that of laying of bricks; turf eight inches broad should first be laid lengthwise along lines drawn on both sides, leaving a space of ten or twelve inches in the middle between them for the loose earth to be filled inn, beat down, and levelled; and when that course is finished, the next course is to be laid crosswise, and should consist of turfs of about a foot long, which being laid opposite to each other, leave only a space of four or six inches between them for the loose earth to occupy; and at the distance of every two or three yards a long turf should be placed the whole breadth, to bind the wall together. In this manner let the workmen proceed, still beating down the earth close in every course, till the wall is near five feet high, and then let a quantity of whins or furze be ready to place under the coping, in such a manner, that the branches project at least ten inches beyond the wall on each side, which will effectually deter sheep from attempting to scale it. Long turfs, the whole breadth of the wall, must then be prepared, and placed with the swart side uppermost, by way of coping all along the wall, observing at the same time, that the earth in the middle of the uppermost course be arched.

so that when the coping is laid on, the closing of the wall may form the segment of a circle, that violent rains may the more readily be carried off. This done, between every sod plant a fer of white-thorn, cut close to the surface of the coping, but these setts should never be suffered to rise above twelve inches high. All the security that fences of this kind require, is a number of spring-gates at the distance of three or four hundred yards each from the other, for huntsmen to pass; for if no violence is used to demolish them, they will in a few years grow as firm as the ground they stand upon. They should be erected early in the spring; for it is of consequence, that turf be moist when it is laid, that the grass may begin to vegetate before the heats and droughts of the summer come on. It may be of use to add, that these walls should be neatly trimmed, and the first opportunity embraced to beat the seams close after any considerable rain, which will facilitate the growth of the grass, and contribute very much to consolidate them. I am positive, by what I have observed in the north, that turf walls will not cost twelve-pence a rod upon the wolds, when men in that country are accustomed to raise them; and there is not the least doubt of their answering the purpose, as there are thousands of houses in Scotland that have no other but sod walls to support their roofs.

Sir Digby Legard recommends double stone walls for bounding fences; with a plantation of trees between them, but the expence of such fences could only be repaid by the success of the plantation, which must be very precarious. But to proceed,

It seems to have been the general practice of old times, to fill the large-rows of most farms in England, with trees of one kind or other: a practice that I would by no means recommend as a pattern for imitation. On the contrary, I would have every

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8 *Of Inclosing, Fencing, and Planting,*

ing, which may be in mild weather, any time after the shortest day in winter, but never before; then fill in the mould lightly, replace the turff, and with a small round-pointed instrument make five incisions in this manner . . . ; into each of these incisions put a sound acorn, just deep enough to be covered by the swart; if the swart should not close upon the acorns, so as to hide them, put a little of the loose mould over them, and so proceed till all the ground allotted for the purpose is planted. An acre of acorns may be thus planted for about ten shillings; but a dead hedge must be raised to surround the young plantation; and this after the rate of ninepence a rod (stakes and bushes included) will amount to six and thirty shillings an acre nearly. A single acre thus planted and fenced, may amount to six and forty shillings; but where a large plantation is taken in together, the expence will not amount to near so much, because less fencing will in proportion be necessary.

But your acorns thus planted and fenced, must not wholly be deserted; they must be annually watched for the first four or five years, and then they may be safely trusted. No grass or weeds must be moved from the young plants during the first four years; for these are their protection; but their growth must be noted, and that plant which shoots with the most vigour, must be principally attended to: if it thrives well and continues its pre-eminence for the three first years, increasing its shoot as it increases its root, then it may remain untouched; but if it springs luxuriantly for the first or second years, and seems to be at a stand, or to decline the third, then you are to cut off the maiden shoot close to the ground, and so of the rest, carefully noting afterwards if the same plant makes again the fairest shoot; if it does, you may then be assured that it

will make the noblest tree ; but if it should not, then you are to place your attention upon the most thriving. This operation should be performed early in January ; and the same year the ground should be plowed and cross-plowed, as near to the rows in which the acorns were planted, as conveniently may be without rooting up the plants. It is now that the tender fibres will begin to shoot forth on every side, and the easier you make their passage in this tender state, the more vigour you will give your plants. In raising every kind of tree from seed, let this general direction suffice ; and though I know that it is contrary to most of those theoretical writers, whose instructions have no foundation in experience, yet it may safely be relied upon. Grass and weeds are not the pernicious things to young seedlings that they are represented to be : on the contrary, they warm and cherish young plants ; and trees in particular, when they arrive at a certain degree of strength, have nothing to fear from them.

My reason for directing the holes to be dug to the depth only of the staple, is this, when the tap-root of the seedling meets with a more than ordinary resistance in its descent, which is its natural course, it will sometimes assume an horizontal direction ; if not, the resistance it meets with when it comes to a more solid stratum, increases the momentum of the lateral fibres ; and in proportion as that is increased, the food of the plant will be increased also : the food of plants is infinitely more copious in the uppermost stratum near the surface, than at any given depth below it ; for this reason it is, that in transplanting tap-rooted plants, all writers agree, that shortening the tap-root in order to increase the lateral fibres, quickens the growth.

At the proper season of the following year, the tenant may be permitted to transplant into the intermediate spaces, the young supernumerary seedlings
that

that have risen from the first planted acorns ; which, if they have happened to escape the vermin and other accidents, will on the fifth year be fine thriving plants ; remembering, however, not to disturb the master plants, but to dress the ground carefully about them as soon as the supernumeraries are removed. These plantings should have their tap-roots shortened, and their fibres where they have suffered injury in taking up, trimmed ; and besides being well secured in fine mould, should each of them have a stiff stake thrust deep in the ground, to which they should be lightly fastened. Nothing more need to be done for ten years to come, but to strip the feathers from the bodies of those trees that are to stand for timber, where they grow too luxuriantly, or to pull off the suckers from the roots, if any should spring forth ; except it should be necessary to smear their stems with tar near the ground, to preserve them from being barked by hares, rabbits, or other animals in the winter. But at the end of fifteen or sixteen years, it will be necessary to thin the plantation, by removing wholly root and branch the supernumerary setts : in the doing of which, the land owner or his agent should be consulted, for many of the supernumeraries will probably have out-grown the seedlings ; and in that case, those seedlings may be removed that are least vigorous, and supernumeraries left instead of them ; for tho' it has been observed, that those trees are generally the most solid whose roots have never been removed, yet transplanted trees frequently grow faster, and are sooner fit for market than seedlings, a circumstance that is of great importance to the land owner.

It will happen sometimes, that trees will take to thriving best in clumps ; when that is the case, none of those should be removed. Some small spots of earth are very friendly to trees, while others very near to such spots, afford them little or no nourishment.

Next

Next to the oak, I account the ash one of the most useful and profitable trees, that can be planted on a new farm. This is a quick growing saleable tree, as well in timber, which is the property of the land owner, as in poles, which are generally allowed to be the perquisite of the tenant. The ash, for timber, is best raised from setts planted at the distance of 16 feet at least, tree from tree; One hundred and sixty plants of six years growth from the nurseries, will cost 4*l*. but in regard that ash is a greedy forager, and sends forth its roots to a great distance on every side, the ground should be well plowed before it is planted, and hills should be thrown up in the same manner as for hops, before the planting is to be performed. There is a wide difference between raising timber from seeds, and raising it from setts. Where the fibres are already formed, the whole ground cannot be made too fine to facilitate their progress. Where they are forming, that part only is necessary to be regarded with which they are at first to be brought in contact. Warmth, in this state, is more to be regarded than nourishment. Ash loves a dry loamy soil, and will perish if its roots descend to a watery bed.

Planting and fencing an acre of ash, will cost

	<i>£.</i>	<i>s.</i>	<i>d.</i>
Plants from the nursery	4	0	0
Plowing and raising the hills	1	0	0
Planting and staking 160 young trees	1	5	0
Fencing	1	16	0

It must be remembered, that I do not set this down as the exact sum for which trees are to be planted in all counties, and in all situations. The setts are abundantly dearer in some places than in others, and the labour in planting bears no exact proportion from whence an average can be deduced. In Scotland, oak, ash, elm, and the nobler kinds of setts of four years growth, are advertised

for

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for five shillings a thousand ; in some parts of England ten of six years growth will cost as much. In Scotland, the labour is one-half cheaper than in England ; and in every county in each kingdom, there is a material difference in both.

Elm may be managed much in the same manner as ash. The preparing the land, and planting the trees for timber, differ in nothing. The distance at which the trees are to be placed, forms the only distinction. Elm will not do for poles ; but elm will bear being planted within the distance of 12 feet of each other, and will thrive the better on that account, as they will rise the higher and grow the straighter : Great care is necessary in the choice of setts to have them straight and well shaped. Planted in clumps they are very beautiful. They thrive best in a moist soil ; harsh clay that is tenacious of moisture, but not of wet, is the kind of soil they most delight in, and in such land they will grow to a vast bulk. About 360 of these may be planted on an acre. Plants of six years growth from the nurseries, will cost about 25 shillings a hundred ; planting and staking an acre about 25 shillings ; plowing and fencing the same as before, &c,

The utmost care should be taken in fencing young elms ; for there is no food that cattle are more fond of, especially cows, than the young shoots. And nothing distorts a young tree so much as their plucking and bending it in cropping.

On thin chalky barren patches, the beech is a profitable tree to plant ; and upon sides of hills or in rocky pits it thrives well, and forms the most beautiful groves. It may either be raised from the mast, or propagated by suckers. The suckers, however, should be first taken into the nursery, and then transplanted out where they are to remain. These, like the elm, may be planted close. Plants at the nurseries may be purchased at 25 shillings

lings the hundred; but may be gathered from the woods for much less than half that sum; it is, however, very bad oeconomy to save in the purchase of seeds, or setts: It is the quality alone that deserves the planter's attention, and not the purchase-money. A good sett cannot be bought too dear; a bad one is worse than none, because it takes up room, and loses time that cannot be recovered. Beech requires no previous culture, for its roots will insinuate themselves and find nourishment among the strongest earths.

The poplar, the plane tree, the white willow, and the alder, are all properly aquatics. They are all propagated from stakes or truncheons, the largest of which may in general be purchased at two shillings a hundred, the smallest at six-pence a hundred, and may be planted at ten shillings a thousand. They are not all, however, alike profitable nor are they to be planted at like distances, nor in like swampy-places. The plane-tree, for instance, though it delights in much moisture, yet will not thrive in stagnated waters. The alder on the contrary, if raised on hillocks, or if deep trenches are cut transversely on every side of it, though in a bog, will thrive the better. The white willow delights in the banks of running streams, and the poplar in springy and marshy bottoms. These require to be protected till they grow up, and therefore when planted at large must be fenced. The expence, however, is very moderate, and the profit promised very large. They are all quick growing trees, and double the profit of crops of corn, when properly adapted to their natural soils. The expence may be thus rated: The poplar and plane-tree planted for timber, should stand at the distance of half a rod. Of the former 640 setts to plant an acre, will cost in general, if gathered from the woods, about six shillings and four-pence; and
the

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the planting them in lines, about the same ~~little~~. No preparation of the ground proper for the poplar is wanting. Fencing, is therefore, the chief expence.

The plane-tree being generally raised from cuttings, may cost about five shillings a thousand, and, therefore, in that proportion, will lessen the expence.

The white willow should stand at the same distance with the former; is planted in the same manner, and at the same expence.

The alder differs but little from the poplar, when planted for timber; both the one and the other may be planted much nearer when designed for poles; but as this is generally the tenant's improvement, notice will be taken of it in its proper place.

What is called the Scots fir, is, perhaps, of all others, the most profitable tree that is planted, if it be considered that it will thrive in barren sandy soils, where hardly any other plant will live. Good plants will cost about five shillings a thousand, and a thousand setts will plant an acre.

The hornbeam is likewise a profitable tree, and will grow on bleak and barren hills; on stoney, flinty, or gravelly soils, and will be no great expence in planting. The setts are gathered from the forests, where they abound, at five shillings a thousand: and they may be planted, as they will want no staking, at the same price. A fence should, however, be thrown round the young plantation, or it will not thrive.

Thus upon an average, 20 acres of land upon a new farm of 500 acres, may be planted with suitable trees for timber, and fenced, at less than five pounds an acre, or one hundred pounds for the whole: And as upwards of 7000 trees, taking the average of the whole 20 acres, as I have stated them,

them, will in 40 or 50 years time, arrive at perfection; it will be no exaggeration to say, that the produce of these spare acres, as they may be called, will in that time repay all the expences of completing the farm. Certain it is, that if the trees are properly adapted, which undoubtedly they may be, on a parcel of land of such extent, well fenced, and carefully preserved from robbers, every tree may be estimated at more than 20 shillings, long before the period that I have allotted. Thus the land owner may be a gainer of 7000 l. and the occupier a gainer at the same time.

Were the trees to be planted along the hedge-rows in the usual manner, the land owner would still be a greater gainer; but the occupier would suffer in a ten-fold proportion. To make this appear, let it be premised, that in inclosing and dividing 500 acres of land into fields of 10 acres each, the lines of inclosure and of division amount to more than 24,000 yards. In these lines, or in other words, in all the hedge-rows throughout the farm, it has been usual to plant trees of one kind or other, at the distance of four yards or 12 feet, and in many farms much nearer. At 12 feet distance the number of trees will amount to upwards of 6000; and at 9 feet distance to 8000 proportionably increased. Add to this too, that trees thrive faster in the hedges of cultivated lands, than in any other situations in which they can be placed, though there they do most harm to the farmer. And from all these considerations, let any one determine which he would chuse, 6, or perhaps 8000 trees growing in his hedge-rows to rob his corn, or 7000 in detached parcels in his worst ground, where no corn would continue to grow without more than ordinary cultivation, and where, on many occasions, after the plantations are arrived at a certain growth, his cattle may be fed and sheltered to his great profit and

and convenience. This is surely a matter that deserves attention in all new inclosures, and of which both land-owner and land-occupier may mutually avail themselves, if the plan is pursued that is here laid down.

It remains now only to speak of that kind of planting that is to supply the necessary purposes of the farmer, and to furnish firing for the farmer's family. This is chiefly coppice-wood.

In all old farms, much of the fire-wood is furnished by the lop of old pollards, the coppice-wood being considered as a part of the produce from which the farmer is to collect his rent. But nothing in nature, I think, can be more absurd, than the old practice of cutting off the heads of growing timber, to furnish fire-wood for the farmer's use. I can account for it only on this supposition, that the hedge-rows formerly being crowded too much, it was necessary to cut off the heads of some trees, to give others room to spread. This is the only tolerable reason that I can assign, for the savage custom of beheading oaks, elms, ash, and other fine timber trees, which seems to have obtained universally throughout the kingdom. This practice I would however explode, and in the room of it introduce a more convenient method of supplying fire-wood, and at the same time a less expensive one.

Every one knows how much time is lost in lopping, trimming, making up, binding, and collecting of billet-wood and faggots, from all the extremities of a large farm. To lessen this, I would apply five acres of land adjoining to the homestead for the sole purpose of planting coppice-wood, for the use of the occupier. In this coppice I would introduce all the ordinary kinds of under-wood, as well as larger growing trees; particularly the thorn white and black, hawthorn, crab, holly, birch, elder, lime, willow, poplar, osier, oak,

oak, elm, but above all the ash, which is a sweet fire-wood, and will burn green, and about a farmhouse is a most useful wood for poles, fellies, tool-handles, cart-ladders, axletrees, ploughs, spades, hoops, and many other purposes. This coppice well planted and fenced may cost 30l. which with 100l. the former plantations, and 280l. the outer fencing, brings the whole expence of the contents of this chapter to the sum of 410l. nearly.

C H A P. II.

Of the proper Situation of the Homestead and Farm-yard.

THE farm being inclosed, fenced, and planted with trees, the next thing to be thought of, is the situation of the homestead and the dwelling-house, and other necessary buildings about it, for the conveniency of the tenant to occupy it, and as nothing, perhaps, is of greater consequence to the farmer, than the situation of his house and homestead; let the following observations be carefully attended to.

1. Let there be plenty of good water, without which no situation can be comfortable: a natural pool, a living spring of soft water, a running brook, or for want of these a good well, or an artificial reservoir. The *first* is preferable for cattle, and may by contrivance be made to supply the house; the *second* is more proper for household purposes, and may by management be made fit and convenient for cattle; the *third* is most useful, as it naturally supplies both purposes; and the last are only to be referred to when the others are not to be obtained.

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2. Let

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2. Let the spot chosen for a homestead be open on every side to the free air, not exposed to violent currents rushing in between hills. The notion of defending a dwelling-house from this or that quarter, by means of hills, is always attended with inconveniencies greater than the advantages we can hope to reap from it. The air blowing equally from all quarters will keep men and cattle in health, as such a situation is proof against the fatal effects of those noxious blasts that frequently spread diseases in particular directions.

3. Let the soil be dry on which you erect your buildings; if gravelly the better, or that kind of soil on which furze or fern naturally grow. These soils are warm and wholesome for cattle; rich soils have a continual humidity, than which nothing is more pernicious for cattle to lie upon. Such a dry soil as I have been speaking of, is not unfrequent near springs of water, and when it can be found on a rising ground with the convenience of a living spring, the situation may then be said to be happy.

4. Let the warmth of your yard proceed not so much from the situation, as from the soil and the management of it. If the soil is dry of itself as is before recommended, your chief care should be to carry off all accidental wet, such as hasty rains, droppings from the buildings, and all waste water used about the house; these collected by proper drains into one certain place, may be made of singular advantage when enriched by the fallage of the yard; for no better mendment than this can be laid upon land, especially upland-meadow; and when land lies convenient to be watered with such enrichment, it will produce incredible crops.

5. The spot to be preferred should be nearly upon a level, rather inclining to the south than the north;

north; or, in default of that, rather to the rising than to the setting sun. It is, however of the greatest consequence, that it should have an easy descent one way or other.

6. Be careful to avoid every situation that is liable to be flooded: small brooks between high hills are very apt to rise to incredible heights upon some occasions. Great caution is therefore necessary, when a promising spot offers on such a brook, lest the many advantages that are otherwise very flattering, should tempt you to overlook this inconvenience. Nothing can recompence the loss that may attend a surprize in the night, when every moment you are in danger of losing your all by a sudden inundation.

It were needless after what has been said, to point at the particular part of the farm on which to erect your buildings. It may however be necessary just to take notice, that were two spots equally dry, and equally supplied with water, to offer, one near the centre of your farm, the other near the edge contiguous to a main road, your choice might be suspended for want of an accurate investigation of the many things that are daily wanted to be done, and the time taken up in passing to and fro to do them. When a main road lies convenient to carry off, and bring to, what may be necessary for the farm, it would be a great temptation to build near such a road, more especially in situations where the making of a good lane of communication from the middle of the farm would be attended with considerable expence; and yet were the builder to be the occupier, I would advise him to build near the centre of his farm, even if the lane of communication were to cost him a month or two's labour with all his strength; for when it is considered that carrying off the spare produce of the farm, and bringing home the few

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things that are wanted for use and accommodation are only to be done at certain stated times; and that all the other business is constant, the waste of time that must necessarily follow from the passing and repassing from one extremity of the farm to the other, must amount in a series of years, that is, long before the buildings will be decayed, to a sum equal to the first erection.

C H A P III.

Of the Buildings necessary to a common Farm.

HAVING made choice of your spot, it is next to be considered what and how many buildings are absolutely necessary to be erected upon it; and what the size of those buildings should be. As this must depend in some measure on the size of your farm, it is necessary to fix some standard, by which gentlemen who may have new farms to lay out, may know how to proportion the buildings on each, to the particular convenience of the respective occupiers, without incurring unnecessary expence. I say, in some measure, for it cannot wholly depend on the size of the farm, because a farmer who rents only 50l. a year, may have as large a family, two or three household servants excepted, and require as many rooms in his dwelling-house, as a farmer who rents 200l. a year, and he must besides have a barn, a stable, a cow-house, cart-house, and pig sty, as well as the other; a separate kitchen, brew-house and granery, are the only buildings which the latter *must* have, and the other *may* do without. The farmer of 50l. a year should have a little cellar under one end of his house; a kitchen with an oven, and a spare room on the first floor, two rooms over these and two garrets.

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rets. The farmer of 200l. a year should have cellars under all his house, should have his hall and parlour on the first floor a little enlarged, and should have three chambers above, with three garrets, and he must have besides an additional kitchen, with a brewhouse, in which an oven should be included; and also a dairy. The farmer who rents 1000l. a year, will want but little addition to these conveniencies for his dwelling-house.

In the construction of the out-buildings, regard must be had to the nature of the soil, the custom of the country, and the particular use to which the land may most advantageously be applied.

If the land is best suited for tillage, then the out-houses must be adapted to the purposes of keeping cattle for plowing; of holding and thrashing corn; of sheltering waggons, carts, and other field instruments; and of preserving straw, &c. for winter-food. If in counties where oxen plow, ox-houses must exceed the quantity of stabling: If where horses only are used, stables alone will be sufficient.

If the land seems to promise fairest for pasturage, then cow-houses, suckling-houses, sheep-cots, dairies, and fattening-houses must predominate; and if for grass, much barn-room seems unnecessary.

Upon the whole, however, as arable farms are what I have principally in view, I shall direct my attention to the necessary purposes of those farms, as in general what may be proper for them, may easily be converted to the purposes of the rest: But even for these, neither the number or size of the out-buildings will bear an exact proportion to the size of the farms, any more than the size of the dwelling-houses already considered.

The 50l. a year farmer's stable (if horses are the plowers) must be large enough to contain 5 horses; the 200l. a year farmer's need contain only 12;

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and stabling for 40 horses is as much as a farmet of the first magnitude will require. The barn is the principal out-building that requires nicety in the erection; and it is perhaps the only building that is the least difficult to adjust. If the farmer of 50l. a year must have a barn of four bays, it might seem that the farmer of 200l. a year should have a barn of four times these dimensions; but it does not follow that barns should be enlarged in proportion to the extent of farms. The threshing floors are more to be regarded, on large and arable farms, than the barn-room; for it cannot be supposed that barns should be built sufficient to contain all the produce of large farms, but floors must be provided sufficient to thresh out all their crops. A barn therefore of ten bays, with three floors in it will be sufficient for almost any middling farm; and barns of those dimensions I would rather wish to be wide than high. A barn, the main body of which is 16 feet high to the eave; and 24 feet wide from side to side, will be 30 feet high to the ridge, which is as high as can well be pitched; and by extending the wings of such a barn with a regular bevel to the height of six feet, you will then have an additional extent of covering nearly equal to that of the main body, and that too with little or no expence, as I shall take occasion to demonstrate when I come more particularly to speak of the construction.

The cow-house, upon an *arable farm* of 50l. a year, according to my apprehension, should be large enough to contain four cows, with a proportionable part partitioned off for two calves; perhaps room for ten cows and four calves may be judged sufficient for a farm of 200l. a year, dairy farms only excepted. Ten cows I would prefer upon such a farm, because that is the proper number to employ a dairy-maid, and it is certainly good husbandry to pro-

proportion the labour to the ability of the persons to be employed; besides, in proportion to the number of your cows, should likewise be your number of swine. Ten cows will support four breeding sows; and less than four breeding sows no farm of 200l. a year ought to maintain, for the sake of the community.

In small farms, the dairy is generally some cool part in the lowest apartment of the house, neatly paved and partitioned off; and tho' the hog sty should be at a distance sufficient to prevent annoyance to the house, yet channels of communication from the dairy would be a great saving in time and labour, and if properly contrived, with a reservoir at the extremity next the sty, much might be saved that otherwise must be wasted.

The hog-stye to a farm of 50l. a year must be large enough to contain two fattening hogs, and two breeding sows: To a farm of 200l. a year, four fattening hogs and four breeding sows may be accommodated in a like sty; but these should be so contrived, as always to be kept clean with very little trouble. To large and extensive farms there is no forming an exact estimate, as in some counties the profit of breeding hogs is looked upon as a considerable part of the farmer's advantage; in others very few are kept; and hogs more than are wanted to be consumed in the family, are looked upon as nuisances. Indeed the breeding more or less depends upon the nature of the farm, and the humour of the occupier, who, if he thinks proper to increase his stock, will not think much of providing lodging for them.

The hen-house, tho' the most inconsiderable building about a small farm, is not for that reason the least necessary; good housewives in small farms are most apt to delight in poultry; and as poultry are among the number of our delicacies that have lately

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It is advanced in price, it is but reasonable, that some provision should be made to encourage the breeding them, and to preserve them when they are bred; in this house, divisions should be made for the accommodation of the several kinds, as turkeys, hens, ducks, and geese. These last, indeed, are seldom bred, unless in the neighbourhood of open commons; however some provision should be made for them where there is a chance of their succeeding. A small farm therefore, will require as commodious a poultry-house, as the most considerable, and in small farms it is most likely to be best filled.

A cart-lodge there must be, and a shed for keeping wood there should be to a small farm, a part of which should be partitioned off for securing the several implements of husbandry when not immediately in use, and for keeping ropes, spare harness, and other tackle together in one certain place; the latter of these will not differ much in size in farms of 50l. and 200l. a year, and yet they are equally necessary in the least as well as the largest.

From this comparative view of the necessary buildings upon a small farm and a middling one, our wonder will cease that gentlemen are now fond of laying small farms together, for when we come to treat of the first cost of building a complete farm-house and all the necessary buildings thereunto belonging, and of the after cost of keeping such a number of buildings in tenantable repair, it will most evidently appear, that a man of fortune may at legal interest make almost as much by lending his money upon mortgage as by inclosing land, were the land to be given him from the waste, building houses and conveniences for poor farmers to occupy it, and letting it out in small bargains.

C H A P. IV.

*Of the Extent of the Homestead and Farm-yard, and
the Disposition of the Buildings.*

IT may be necessary here to remind the reader, that I now proceed upon the supposition that the farm to be annexed is an arable farm, of 500 acres of land, and that according to Mr. Young's Average of Rents, 50 miles distant from London, 500 acres may be rented for 200 l. a year.

The extent of the homestead of such a farm, should be at least 20 acres. These 20 acres being well considered, and every circumstance relating to them in every respect examined and approved, should then be fenced exactly in the manner as the first inclosure. But before I proceed, it may be necessary to explain myself. By Homestead, I would be understood to mean a portion of land connected with the farm-yard, to which the cattle may at all times have free access, and which, for that reason, should be strongly defended on all sides, to prevent their breaking out or straying. Three acres of this homestead I would apportion for the cattle-yard and the necessary buildings and other conveniencies on every side of it.

For the yard I would allot a square of 70 yards from front to front, on the southermost side of which, I would set out the dwelling-house, and *that* neither upon too extensive nor too narrow a plan. I would neither have my brother farmer live in a splendid house like his land-lord, nor in a mean cottage like his day-labourer; but in a comfortable, dry, decent dwelling-house, in which there should be neither room for profusion, nor want of convenience for true English Hospitality. On this moderate plan I would proceed, and exactly

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rectly in the middle of this southerly line of 79 yards, set off a space of 40 feet in length, and 16 feet in depth, for the ground-plot of the dwelling-house. Behind this I would mark an additional space of 14 feet by 36, for a kitchen and brew-house; all which should be substantially built of brick or stone, except the brew-house, which should be brick or stone breast high, and the remainder of timber, constructed in the ordinary manner for dissipating the steam.

On the extremity of this line, I would set off the sty, twenty-six feet in length, and in depth thirteen, and next adjoining to that, the poultry-house thirty feet in length, and thirteen feet in depth; this last should be divided into several apartments, as has already been remarked; in all which there should be convenient divisions for laying, hatching, feeding and fattening. To this should be annexed a little yard, pale'd close, and fortified with spiked laths. On the other extremity of this line, the cow-house 60 feet in length, and 13 in depth; a wall of a moderate height should connect the whole; and this wall should serve two purposes, *one* as a back to the buildings just mentioned, the other as a garden-wall, as may be seen in the plan annexed. The sty, poultry-house and cow-house, need only be scaling buildings. My reason for this disposition is obvious, the milking the cows, feeding the swine, and tending the poultry, are works of daily employment, and should be as near as possible to the dwelling-house, without annoying it; and some flowering shrubs, or useful trees in the intermediate spaces, will, if properly disposed, have a very good effect for that purpose.

Directly fronting the house on the opposite line, I would advise the barn to be placed, which for a farm of 200l. a year, I judge cannot have less than three floors. That nothing, however, may appear

to be done at random, the principle upon which I proceed is this: I suppose that in 500 acres of an arable farm, 200 acres will always be in corn, and these I presume will, upon an average, produce four quarters of grain of one kind or other upon an acre; in all, 800 quarters annually. As one man is supposed to thresh 3 quarters of wheat in a week, and 5 quarters of other grain, I thence conclude, that six men in 3 threshing floors will thresh about 20 quarters of grain weekly, which, allowing 40 threshing weeks in the year, and reserving twelve for hay-time and harvest, will just accomplish the supposed quantity in the given time. Thus, I think, a rule is laid down for proportioning the barn room to any farm, near enough for gentlemen to follow, and which I believe has never before been adjusted.

Behind the barn, a space should be left for a rick-yard, which space may be bounded on one side by the common fence of the homestead, and on the other by the body of the barn; the ends may be defended by posts and rails, the latter of which, while the corn is carrying, may be so contrived as to be taken down, and when harvest is over, may be locked secure, that no carriage may enter without the master's permission. Country carpenters know well how to construct such fences, and likewise how to contrive their fastenings. To prevent waste, dormers may be left in the roofing of the barn, to receive the sheafs from the ricks, which will save not only much corn, but much time in carrying. Between every floor one or two of these dormers may be left, and by placing the ricks in a proper direction, much of the corn may be pitched into the barn, without being thrown down.

Adjoining to the barn, at either end, a passage should be left for waggon to pass freely to and from the rick-yard.

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In the center of the east-line of the farm-yard, should stand the stable. A building 22 feet in front, and 38 feet in depth, will hold 15 horses conveniently. The loft over such a building will contain straw and provender for the horses, for 14 days, and more than that quantity should not be stored at once. In this loft may likewise be partitioned off a chaff-bin, and a convenient place for an engine to cut chaff and a man to work it. This stable should be 8 feet high from the pitching to the floor, and from the floor to the eaves 6 feet. This will admit of many conveniencies, as a part of it may be filled up with a double floor, and lodging rooms for men servants made in the upper story. Adjoining to the stable, on one side, should stand, by way of lean-to, the tool-house, for ploughs, harrows, cart-ladders, and all kinds of instruments for husbandry: And on the other side a chaise-house, and shed for keeping spare harness; a straw-house and chaff-house; these necessary erections, if provided for at first, will add very little to the general expence, and will appear all of a piece. When they are left for the occupier to provide, one thing is torn down to erect another, and the whole figure is defaced. A well formed farm-yard will be no discredit to any gentleman's house of moderate fortune, and the plan here laid down, has a view to a genteel tenant, if any should offer; at the same time, that it is neither too great nor too costly for the class of common farmers.

On this line, and at a convenient distance from the stable, and near the barn, should stand the cart-lodges, six in number, 8 feet each in front, and 16 feet deep, open both in front and rear for a free passage. These may be separated by sound oak posts six inches square, the corner posts only excepted; and these should be 8 inches square. The corners of all these posts should be rounded off;

off. They should stand on stone plinths, set flush in the ground, and hollowed in the middle about an inch deep, to receive the substance of the posts, all but the shoulders, which should rest upon the plane of the stone, to prevent the wet from getting into the hollow to rot the wood. These posts should be well tarred at bottom before they are put up, and will then last for many years, provided they are cut out of sapless oak. Over these cart-lodges I would erect the grainery, as well for security against vermin, as for saving expence. Roofing is a considerable part of the first cost of all buildings, and the most expensive in keeping in repair; and I am surprized that it is not more attended to, in the construction of buildings for the farmer's use. A very little more roofing than would be necessary to cover the cart lodge, will cover both them and the grainery. And the stone saddles that would be necessary for supporting the grainery, were it to be built singly, will nearly pay for the posts that form the cart-lodges.

Behind this line, and near the stable, should stand the hay-stacks, and in the sides opposite to each other, should be doors to receive the hay, that as little time as possible may be lost in that business.

On the opposite line to the stables something is still wanting to complete the square; and it were happy, if a running stream, or pool of water could be here introduced: Such a conveniency would be an unspeakable advantage to the occupier. But if neither of these can be had, a good pump with a large stone cistern, or, in default of that, a brick reservoir about 30 inches high, laid in arras, and rimmed with good oak plank should be contrived. The reservoir should surround the pump in a circular form, and from the body of the pump to the rim a plank should be laid, for a man to stand upon

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upon to work the pump. This reservoir should constantly be supplied with fresh water every day, and should have a plug at bottom to let out the sediment, in order to clean it occasionally. From this pump a channel should run to the middle of the yard, and the ground should be so laid out, that the stale of the cattle should run freely into that channel. The most convenient spot would be in the center of the line, on each side of which should be sheds, with racks from one end to the other, for cattle to feed dry in wet weather; these racks may be so contrived, as to be supplied with hay from stacks placed behind them for that particular purpose; or with fresh straw from the barn every day during the winter.

From this line, passages of communication should at all times be open, for the cattle to pass freely to and from the homestead. If in that homestead there is plenty of water, then such a pump as I have been speaking of will be unnecessary; for cattle, when they are dry, if not restrained, will find their way to water, whatever the distance may be to the place they are wont to drink.

It now remains only to speak of the yard, in the formation of which a little attention will be necessary. It should be observed that whatever earth may be wanted to raise the foundation of any of the buildings, should all be taken out of the middle of the square allotted for the yard, not dug out of any particular hole; but gradually taken up, beginning deep at the centre and extending from it on all sides in a shallow direction, till nothing at last is pared from the surface. This in time will shape the yard into the form of a hollow dish, the true form it should bear. By allowing the yard the scope of 70 yards, there will be room to form a compost-hill of vast dimensions in the middle of it :

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its. And if all the buildings are contrived to rise about it, the drains will all empty their contents in and round the compost-hill; a circumstance, that, however trifling it may seem, will add many bushels in a year to the farmer's store. It will be of no small advantage likewise in saving the labour of carrying out dung to rot on spots at a distance from the yard, as the time taken up in filling and carrying may be employed to great advantage in plowing, fetching other manure, and preparing the land. All farmers are sensible of the loss sustained by moving manure twice; provided the same benefit can be obtained of rotting and turning it on the spot where it is first made. This, however, will depend in a great measure on the mixtures that are to compose it. If, for instance, the earth of a headland were to be mixed with the dung from the yard and sillage, in order to be laid on the same field where the headland was thrown up, then indeed the difference would depend upon the quantity to be moved. To bring the mold from the field to lay it on the dung-heap, with a view to carry it back again, might generally be condemned as bad economy, and yet, if this were done only to add to the whole mixture a proportionable quantity of this earth, this practice might well be justified, even though a very large share of the compost was to be laid on the field, from whence the mold was taken. This, however, is a question hardly worth debating, in a treatise where many more interesting questions will naturally offer, in order to be discussed. I shall therefore conclude this chapter, with referring the reader to the plan, in which I have endeavoured to reduce into one view all that has been said, and to represent in miniature the four fronts of the yard, which I have found it difficult to describe intelligibly, in words easy to be understood by every farmer.

CHAP.

C H A P. V.

*Of the Construction of the Buildings on the first
Line of the Farm-yard.*

OF the buildings about a farm, the first to be considered is the dwelling-house; in the setting out of which, as the dimensions have already been declared, there is nothing particular, except that in laying the foundation, the cellar need only be dug three feet deep, and the foundation laid on by one brick lower than the level of the intended floor; all that are laid lower being only a waste of materials without use. Workmen are fond of deep foundations, because much rubbish is buried, for which they receive the same price as for the best materials and workmanship, but gentlemen who build with a view to profit should endeavour to prevent impositions: I would however particularly recommend, that the outer walls should be laid upon thin boards, half-inch elm or yellow-deal are the best, which tho' of little substance will infallibly prevent any after settlement; provided the ground be dry and nicely levelled upon which they are placed; nor is it necessary in houses of an extensive base, provided the boards are 15 inches wide, that the lowermost courses should be wider than those that are to compose the wall. A fourteen-inch brick wall, carefully wrought from the foundation to the uppermost story, is strong enough for any farm-house; and a nine-inch wall, four-feet high from the floor of that story to the roofing may be depended upon, if the materials and workmanship are good, to last for ages.

It will be a very considerable saving, if the earth which is dug for the cellar be laid on the space intended for the kitchen and brew-house.

This

This earth will not only raise that space to the height of the ground floor of the dwelling-house, but afford enough to slope away easily on all sides to the whole extent of the house, which in time, when the ground is settled, and thoroughly consolidated, will be a means of keeping the back part of the house dry. This will be attended with another convenience, for the front wall of the cellar, will by this means be three feet above the level of the farm yard, which will give room for the windows to be above ground, and admit a free circulation of air to the dairy, which by the plan is intended to be one good room in the cellar. It may here be necessary to add, that nine-inch walls for the kitchen, as they are only to be carried 7 feet high to the eaves, will be sufficient; and for the brew-house, very little walling will be wanting, as that may be constructed in the manner already directed.

To gain room in the chambers above, the stairs may break 3 feet into the kitchen, and this may be done without being perceived, if the workman employed be a man of ingenuity. The rise of the stairs to the first floor, will give height for a head-way into the cellar, and their return a head-way from the hall to the kitchen; the middle rooms above, will, by this means lose only $3\frac{1}{2}$ feet of their dimensions, and the breach into the kitchen will serve for convenient closets.

The kitchen should lose as little as may be of its height, the inside of the roofing should be covered, and only a tie-beam or two, well secured to the wall-plates, should cross it, as well for strength as for use.

To gentlemen who are unaccustomed to building, it may be a necessary caution to note, that at the walls of the cellar are bringing up, the
D ground

ground should be well rammed between the wall and the solid ground; and that, where the walls of the kitchen are to be united with the walls of the dwelling-house, the ground underneath should not only be rammed, but a thick plank should be laid from the solid ground into the wall 3 feet long, to serve as a foundation, lest the walls of the kitchen should part from the walls of the dwelling-house, and occasion a settlement.

Another caution may be necessary, and that is, that every story be well bonded. Three strings of bond-timber at least, should regularly tie together the brick-work of every farm-house, the *first* should be laid in between the *second* and *third* courses above the floors; the *second* between the *eleventh* and *twelfth*, and the *third* within *two* courses of the ceiling. This bond-timber should be just the thickness of a common brick, or perhaps the 8th of an inch thicker, 4 inches wide, and should be lapped and pinned at the corners throughout the whole building. These minutiae, by some, perhaps, may be thought tedious, but as a few chapters at first setting out are calculated for readers only of a certain class, I am persuaded that those for whom they are designed will profit by attending to them.

The heavy taxes, with which the farmer is burthened requires that attention should be paid to whatever may be saved. To rooms therefore of the dimensions which I have allotted, one handsome sash-window will give light sufficient, and except to the dairy no more is required in each.

It remains only to consider the roofing of the dwelling-house. As I have planned the chimnies at the gable-ends, I would particularly recommend a full pitch and sailing eaves, a foot at least over the sides, and the same over the gable-ends. In
light-

Lighting the garrets, the windows of two of them may be placed in the gables, that of the middle room may be arched in the front wall. This method of construction will save expence, and will besides preserve the roofing entire, than which nothing can be more essential about the building; for broken roofs, how artificially soever contrived, are very liable to leak. Indeed, in the methods I have proposed, some small rising will perhaps be necessary in the back roof for a headway in ascending the uppermost stairs, but thin slips of lead properly introduced will secure the angles from leaking for many years.

The scantling of the wall-plates for the roofing should be 3 by 6, and of the ordinary rafters 2 by 5; the coupling rafters, which should be every fourth, 4 by 5, and should be mortised and pinned at top, and notched, corked, and pinned to the wall-plates at bottom. The wall-plates should be well tied at the ends by bonds let into the gables, and at the sides by ties across the partitions. All the rafters should be notched and spiked to the wall-plates, and the crow-feet which are to compose the eaves should be well secured and covered.

In coveing the garrets, collars will of course be introduced for the sake of lathing, which will be a great support to the tiling.

These precautions observed, good tiles made choice of, and a good tyler employed, a house thus roofed and completed will want no repairs for many years, more especially if wooden gutters, well pitched, be added to carry off the drip from the foundation.

The cow-house should be a brick-building, if, as I have already observed, bricks are the usual material of the country. Timber-buildings are by much the dearest in the end. And as nothing

more is wanted throughout the whole, but a plain nine-inch wall, about $5\frac{1}{2}$ feet high in front, and 19 feet behind, strengthened with fourteen-inch piers, the expence will be moderate, and the building durable. It should be bonded about the middle; the wall-plate should be tied in three or four places with tie-beams, 3 by 6; the rafters, 3 by 4, should be notched and spiked to the wall-plates, and should fall over the front about 8 inches: Pan-tiles may cover the roof, and the gables may be filled up with oak-lathes, latticed for free admittance of the air, as horned cattle should never be kept hot.

On the other extremity of this line, may be placed the styes, in the construction of which, some are very curious; but for a farm-house, a little attention to the situation and form of setting them out, will be quite sufficient. Every sty should be 8 feet in front, and 16 in depth, 8 of which should be covered for a resting or sleeping-place; the other 8 should be open for feeding. The resting-place should be a perfect flat; the feeding-place should slope at least eight inches from the resting-place; and before the styes should run an open channel, at least 8 inches lower than the lowermost slope of the feeding-place. This channel should communicate with a drain of conveyance, which should carry off the fullage of the styes, to the common receiver of the fullage of the whole yard. The number of styes need not exceed three. Where four breeding-fows are kept, or even six, seldom any two of them farrow just at a time, and it is not always necessary that even these should keep their chambers a full month; add to this, that as two hogs are generally fattened in the same sty at a time, several may be fattened in the season, without much encroachment on the chambers of the breeders. Watering-troughs may be contrived

trived to form the fronts of the styes, and cribs for supplying hard meat, may be framed to the sides. In styes thus constructed, hogs may be fed and kept clean with very little trouble: The sows may be allowed the run of the yard, by means of falling doors, while the little pigs may be kept warm in the chambers till fit for the spit, or to follow their dams.

The poultry house, like the others, need only be a sealing building: the sides and front should be of brick, as nothing rots timber sooner than fowls dung: round rods should be placed lengthways, one above another in the form of stairs, in the turkey and hen-house; and a range of nests should surround the floors. The housewives generally tend the poultry, and they are the best directors in fitting up their houses. Those however, who are most successful, have a small inclosure annexed, divided into separate plats, planted with low growing shrubs for sheltering their tender broods; these should be well supplied with water, especially in that division allotted for the brood of ducks. In these inclosures, the different species are separately kept, till they have strength sufficient to bear fatigue, and then they are turned out to take the run of the yard, when new broods are ready to take their places. The orchard should join to this inclosure, or rather the inclosure should be a part of the orchard, that the poultry may have an open space to range in, as soon as they are suffered to live at large.

Nothing remains to be spoken of in this line, except the well, the garden, and the orchard. One conveniency indeed is wanting, but that may be neatly made in a corner of the cow-house.

If a well is to be dug, the most convenient place will be behind the kitchen, where marked in the

34 *Construction of the Reservoir for Water.*

plan; there it may at a small expence be made to supply the brew-house and dairy, as well as the kitchen. If the water should happen to prove hard, there is an easy way of softening it, and that is, by mingling it with clay in a large cistern, stirring it about till thick and cloudy, and then letting it stand exposed to the open air till it settles. Another way of supplying the want of soft water is by digging a round pit 8 or 9 feet deep, and as many in diameter, laying a double floor of tiles in arras at the bottom of it, and working up the sides in the same mortar. This should be shaped in form of a bee-hive, leaving a mouth at top large enough for a man to enter, which mouth should be covered with a lid perforated with holes for the admission of air. The situation should be in some convenient angle, where the rain that falls upon the roofing may be best collected into one pipe, and by that pipe conveyed into this reservoir, into which a leaden pump should be inserted for pumping up the water when wanted. If this reservoir is made large enough, hardly any family will ever want water for all the purposes of the kitchen. And tho' this water will grow foetid, and will smell disagreeably when fresh out of the pump, yet, exposed to the open air for 24 hours, it will become perfectly sweet, pure, and limpid, and thus sweetened is by far the wholesomest, as well as the pleasantest water that is used. This is a fact founded on many years experience at Clayhill in Kent. Perhaps the new discovery of mixing clay in the reservoir may contribute to preserve the water sweet, but as that has never been tried in the place referred to, it is not asserted, but offered for experiment. It is happy for those who have a natural supply of soft water; expedients like these are only shifts in situations where that is denied.

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The garden may conveniently be disposed behind the south line, where the walls of the scaling buildings; on that line, will afford an excellent aspect for fruits of the very best kind.

To a house for a farm of 200 l. a year, a good orchard should be annexed. This should be contiguous to the garden, but not a part of it. It should be bordered on the outside with the crab-apple, as least liable to be robbed, and most necessary for use, there being no medicine more valuable to the farmer, than verjuice kept to a proper age.

Having in this manner compleated our first line, let us conclude this chapter with an estimate of that part of the premises contained in it. A dwelling-house, kitchen, and brew-house of the dimensions marked in the annexed plan, with a cow-house, sty's, poultry-house, and wood-house, the walls of brick, may be erected, if the land owner will give himself the trouble to be his own builder, for 400 l. I am aware, indeed, that in many parts of England, where the materials are put together in the rough, that farm houses and the appurtenances belonging to them, may be built at a much cheaper rate, but the calculation that is here made, is for brick or stone buildings with the necessary carpenter's work, performed in a plain, but neat and substantial manner, such as is fit for persons of a middling rank in life to occupy, with a very small addition of proper finishing.

C H A P. VI.

Of the Construction of the Barn, &c.

WE will now proceed to the opposite line, on which should stand the barn; and as the barn is the principal building that occupies this line, something more is necessary to be said of it than has already been premised.

A barn with three floors will commodiously consist of 18 bays. The bays of a barn, as I under-
stand

stand them, are the intermediate spaces between the main supports that are framed for the more firmly strengthening and connecting the whole fabric together, and may properly consist of eight feet each. They are of very simple construction; and by knowing how to construct and connect two of them, any number may be constructed and connected in the same manner. The general fault in building barns is loading them with too much timber, in so much, that I have seen some ready to sink under their own weight.

It will, therefore, be doing service to gentlemen, who may have occasion to erect edifices of this kind, to shew the manner in which they may be substantially constructed, and that at a moderate expence.

In the division of a barn, three things are necessary to be observed, First, The stowage of the corn; Secondly, The handiness of flooring it; and Thirdly, The convenience of threshing and backing the grain when it is upon the floors. A barn, for these reasons, should rather be wide than long; when wide, the sheaves lie handy to be floored; the corn, when threshed, is easily backed; and, when cleaned in the old way of casting, is infinitely more neatly performed, than it can possibly be when the barn is narrow. It is likewise of importance, that the floors be large, and that there may be room sufficient to back the grain of five days threshing in the chaff, that the sixth only may be taken up in cleaning.

Barns may commodiously be divided in the following manner; the extremities or ends to consist of two bays, or 16 feet each; the floors 16 feet each; and the intermediate spaces between the floors 32 feet each; and in those proportions a barn may be extended to any length required.

Those farmers who are very curious in keeping separate their different kinds of grain, and who, for that reason would rather chuse to have several barns, than one barn, may, by running up partitions in the middle of the intermediate spaces between the floors,

doors, divide barns, constructed in the manner here directed, at a very trifling expence.

As to the width, 24 feet wide, with wings and porches, answer every purpose completely; a barn of that width requires no immoderate quantity of timber to support it, the bearings may be nicely proportioned; and the inside so contrived as to give very little obstruction to the filling it. I would exclude elm timber from barns; oak and fir work neatly together, and retain their bearings for ages; but elm is continually twisting and bending, and the workman gets no credit by framing it, tho' ever so nice.

In the plan, in which is sketched the manner of constructing the principal supports of a barn, the ground-plate A A, fig. V. should be of oak, 4 inches by 7, laid upon a brick foundation, so as to flush with the outer face of the bricks; because when there is no wings, and the bricks project beyond the plate, they catch and retain the rain, by which the plate is the sooner rotted. The corner and door-posts B B, whether of the porches or the body of the barn, should likewise be of sound sapless oak, 7 inches by 7, which in an upright position will support any pressure that can be laid upon them. The intermediate posts C, may be of sound fir, 6 inches by 6, flushing with the outer edges of the ground and wall or raising plates. The interties or entities D D, as their bearing is long, should be 4 by 7, and should be tongued edge-wise through the posts, one six inches above the other, to weaken as little as may be the substance of the posts, the space between the mortices should be exactly in the middle of the posts, and where the interties are morticed below the middle, the spurs or struts a-top E E, should be proportionably lengthened, and come below those on the opposite side, at least eight inches. The scantling of the struts, should be 4 by 5; they should be tennanted into the posts and raising plates F F, so as to flush on the outside, which should run

fair

fair throughout the whole building. From the posts should spring the principal or coupling rafters H H to the full pitch, that is, eight feet perpendicular height above the beam, or in length 18 feet each; they should rest on the beams, and be tenanted into them; their scantling at the base 6 by 5; at top the upper side should be diminished to 4 inches. A solid piece, 19 feet long, and 10 inches square, cut catering one way, and streight through the middle the other, will make two pair of these couples. Into these couples should be tennanted the purlines G G, 5 inches by 7, to support the small rafters, these purlines should run in a direct line, and should be tennanted and pinned into the principal rafters, and should be cut so as to answer their bevel. The small rafters should be 2 by 5, corresponding to the depth of the principals, so that the inside of the barn will shew fair from end to end. The principal rafters should be clasped and pinned a-top, and the small rafters morticed into the purlines. The dotted lines I I, shew the width of the porch, and likewise the place of the framing posts in the body.

For allowing room in the inside, which is the chief object, I have given two views, fig. VI. and VII. In fig. VII. the braces A A are tied by the hammet-beams B B, and should be tongued thro' the posts and rafters, and securely pinned, and the principal rafters are strengthened by the collars C and D, the lowermost of which should be tailed into the rafters for greater security against spreading. Fig. VI. differs in nothing from the ordinary method of construction, except that the struts, a a, are thrown back for the freer admission of the sheaves, instead of standing upright.

In returning the angles, there are many ways, but the simplest is the best, and that is, by clasping or letting the plates into one another so as to flush, and then tennoning the corner posts into them above and below. And to strengthen the angles still more, a short

short spar may be sprung from the post on each side, and may be morticed and pinned into the plates, which will take off a considerable part of the stress, and for ever preserve the angles from spreading.

It remains now only to speak of the tie-beams and their braces; those below should be three by six, crooked and pinned to the ground-plates at 16 inches distance from the posts; they should lie flat on brick foundations, and will serve for bottoms to the backs of the threshing floors, something of this kind being necessary, had they no other use. The tie-beams to the wall plates above, may be of the same scantling; but should be carked and pinned-edge wise, levelled and brought nearer to the posts, for the sake of bracing. The braces ($2\frac{1}{2}$ by 6) should take their rise 2 feet below the middle of the post, and should extend 8 feet, that is, one third of its length upon the tie-beams, and may be let in about an inch, and lap upon both the post and tie-beam, being strongly secured by two pins to each. In the same manner the ties at the angles should take place; those below should lie flat on brick foundations: those above be tongued into the plates.

From this body of a barn, 16 feet high, wings may be extended 10 feet, which will add a vast extent of barn-room to the building, the advantage of which is well known to every farmer; and as these wings will add very little to the general expence, it is the interest of every land-owner to accommodate his tenant when it can be done upon moderate terms, in order to enable him the better to pay his rent. Were the body of the barn to be completed, a great part of the timber that will be necessary to form the wings, would be taken up in filling up the interstices; and the quantity of weather-boarding, upon the whole, would be nearly

ly double. The porches in winged barns are the greatest expence; yet as only one barn is proposed for a farm of 2001 a year, it may be thought reasonable that it should be built complete. The foundation for the ground-plate must be of brick, the ground-plate must be of oak, and so must the 4 corner-posts. The porch-posts must be the same, and as they must be 16 feet high, and sustain the doors, they may be exchanged for those allotted for the body of the building, and ordinary puncheons placed in their stead. The corner-posts 6 feet high, may be 5 by 5; the puncheons, 4 by 4; the braces, 3 by 3; the transoms, 3 by 4; the ground-plate, 3 by 6; and the wall-plate, 4 by 5; the quartering, 3 by 3; and the rafters, as they are pretty long, and have no purline, should be 3 by 5; tie-beams there must be above and below, and they must be 3 by 6: on the well securing of them, the whole strength of the wings depends.

The covering of the barn, were it not for the harbour it affords to vermin, I could wish to be of thatch, as that is least liable to be hurt by pitching; but vermin and fire are two very great objections to thatch. It is on these accounts that I recommend tiling, or slating to all the building about a farm-house. Slating is a very light durable covering, but in many places much more expensive than tiles of any kind. Pan-tiling is very reasonable, and may be profitably used for any other building about the farm except the barn, but as that requires a close covering, to keep out driving rains and snow, great care should be taken to make the roof secure. Pointing in the inside is sometimes used, but that I by no means approve, because the mortar is very apt to moulder among the corn, which causes a grittyness that can never be removed.

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To complete this article of the barn, let us just take notice of the flooring, which it would be a considerable saving to the occupier to be properly secured: a mixture of lime, cut horse-hair, drift-sand, temper'd clay, and horse-dung laid pretty thick, will make the floor impenetrable to vermin of any kind.

Perhaps it may be thought too minute to give any directions about the threshing floor; yet as I have seen the joists of many floors soon rotted, I would give this caution, that instead of laying them upon the round, they should be laid upon little brick piers, about four feet asunder. This will give the floor a springyness of great use in threshing; and withal will preserve the joists from decaying; these should be 4 by 5, of good sound fir laid edgewise, and the boards with which they are floored should be $3\frac{1}{2}$ inch well seasoned oak, well planed and jointed; and should be firmly rammed together and douled, and afterwards pinned down upon the joists; a nail should not be used in the whole floor. This floor should run the whole width of the barn, and should be terminated at the porch-doors by sliding racks, to take off occasionally.

The doors cannot be made too light, so they be of yellow-deal, ledged with the same, and strengthened with braces, running diagonally from one corner to the other. The hooks upon which the doors turn, should be proportionably strong, and the hinges should run the whole breadth of the door, should be let into it, and should be riveted upon the middle of the lower and upper ledges, and should be particularly thick and strong towards the shoulders.

This barn, 184 feet in length, 44 feet wide, including the wings, and 30 feet high from the floor to the ridge, will, with the avenues at each end to
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the sick-yard, nearly occupy the whole north line, as the dwelling-house, &c. did the south line; and the expence of this barn will not perhaps be so considerable as it may seem. It may be completed, if the workmen are honest, for 300 guineas, fencing the sick-yard included, which should not be less than 22 yards in depth, and its length the whole extent of the barn.

CHAPTER VII.

Of the Construction of the Stable, Chaise-house, Tool-house, Wood-house, Chaff-house, Cart-ledge, and Granary.

THOUGH in the construction of the barn, I have made choice of timber materials, I would by no means advise those of the stable to be such. Corn is apt to contract a mustiness from the damp in stone and brick buildings; that is very disagreeable; but nothing of that kind is to be apprehended in stables: durability and incorruptibility are therefore the only considerations that should have place in the construction of buildings where animals of any kind are to be confined. Add to this, that in many places, brick or stone are less expensive than timber. A brick building 60 feet in length, 16 feet wide, and 14 feet high to the eaves, may be erected from the foundation, and covered with pantiles, pitched, floored, and furnished with racks, manger, and other conveniencies, for 125*l*. nearly, supposing the walls of the loft to be only 9 inches, which is strength sufficient, if care be taken in the roofing. In this stable I would have 3 floors at 15 feet from each other, and over each door a glazed light; there should likewise be as many windows both in the

Construction of the Stable, Granary, &c. 47

the front and back-walls; for in the heat of summer cattle cannot be kept too cool: these windows may be racked but should have shutters to close in the winter, when warmth is as necessary to preserve health as coolness is in the summer.

There is nothing particular in the construction of the Stable, except that openings should be left to the hay-yard to receive the hay, and in the front to take in straw. And as I have already mentioned other conveniencies that may be contrived: I shall conclude with only observing, that in the front-wall a stout piece of bond-timber should be laid about the height of $6\frac{1}{2}$ feet, furnished with strong pins for holding the harness, bridles, &c. than which nothing is more necessary about the stable.

Adjoining to the stable, to the right, should stand the chaise-house, to which should be continued the tool-house, and wood-house, buildings divided from each other only by thin partitions, and of no considerable expence, as the walls need only be 9 inches thick, their height eight feet, their covering pan-tiles, and the rafters 2 by 5 only. The chaise-house 8 feet, the tool-house, 10 feet, and the wood-house 16 feet, in all 34 feet in length, by 16 feet in width, may be erect for 50l.

On the left-hand should stand the chaff-house and straw-loft. These should be of considerable dimensions, particularly the loft which should communicate with the stable, and need only be divided from it by a stout wooden partition reaching as high as the eyes only. The chaff house need only be 6 feet high, which will give height and room to the straw-loft. Besides a door to the chaff-house, there should be a trap-door above, for the readier supplying the stables; every contrivance for dispatch should be attended to, where time is of equal value with money; and in
the

48 *Construction of the Stable, Granary, &c.*

the farming business it may be laid to be of more than equal value, as time misapplied cannot be recovered at any price. The chaff-house and loft being an additional building to the stable of the same height, the same width, and only 30 feet in length, wanting no pitching, nor any other than a pantile covering, may be substantially built for 50*l.* Between this last building and the barn, leaving a free passage for waggons, &c. should stand the cart-lodges, six in number: these should be 8 feet each in front, 8 feet high, and 16 feet in depth; and over them may be placed the granary. This granary must be of a new construction; not more expensive perhaps than those upon the present plan; but better adapted to the purpose of preserving corn. The pillars that support this granary, as has already been noticed, will form the cart-lodges, and the plates that otherwise would be wanted to support the covering of the cart-lodges will serve the purpose of girders to support the joists for the floor of the granary. The sides of this granary need not be above 8 feet high, and the framing it should in every respect be the same with that of the barn already described; but instead of weather-boarding the upper part, I would advise lathing, for the free admission of the air to the stored corn. To defend it from rains, let the eaves overhang the building at least 18 inches, and to preserve grain, puncheons should be ranged on every side upon a line about 18 inches within the walls, to leave just room enough for a man to pass between them and the walls. Against these puncheons, boards at least 1½ should be framed to the height of 6 feet, which then will have the appearance of a large chest placed all along a great room, with only a space left to pass round it. This will preserve the grain sweet, and by proper partitions one species of grain

Construction of the Feeding-sheds and Cistern.

may be kept separate from another, or the same grain may sometimes be shifted and screened, and by that means kept fit for use many seasons. In this granary screens may be contrived in the floor, which by means of valves underneath, may be easily applied to facilitate the operation of sweetening the grain, without losing much time.

The flooring of this edifice must be particularly attended to. Well-seasoned boards must not only be made use of, but they must be well planed, edged, and tongued. The screens, of which there should be one in every division, should be nicely fitted. To do this the screen-maker must fix them in stout frames, and the carpenter will then have no difficulty to fit them to the floor. The valves that open underneath, must be well secured with strong hinges, bolts and locks. The whole together, I estimate at 140*l.* nearly. The expence therefore of the buildings on this line will stand thus:

	£.	s.	d.
Stable,	125	0	0
Chaise-house, tool-house, and wood-house, with a pidgeon-loft over them if thought necessary	80	0	0
Chaff-house, and straw-loft,	50	0	0
Cart-lodges, and granary,	140	0	0
	£. 395	0	0

C H A P. VIII.

Of the manner of Constructing the Feeding-sheds and Cistern.

ON the West-line, instead of a number of cribs, standing promiscuously in the yard, I would erect an open shed, furnished with racks the whole

50 *Construction of the Feeding-sheds and Cisterns*

extent, except leaving only convenient openings for the cattle to communicate with the homestead. This shed need not be more than nine feet deep, the back a nine-inch brick-wall twelve feet high, strengthened by fourteen inch piers at about ten feet distance from each other, and closed with pillars two bricks square. A plate of four inches square, supported by oaken posts of five inches square, should form the front, and rafters of two by five, should support a covering of pan-tiles without mortar. A channel to carry off the water should run along the front; and should be so contrived, as to convey the sullage to the middle of the yard.

These sheds will be of infinite use in winter for sheltering and feeding sheep in severe weather, for which purpose, and that only, if a number of sheep were to be kept upon the farm, the money would be well laid out, if the occupier was to be the paymaster.

If a pump should be necessary, the method of constructing it to supply water for a number of cattle, is this; having dug your well, and steined it, you are next to adjust and fix your pump properly, and then dome your well nicely to close it. This done, you are to level a space all round, to the distance of four feet; and having a quantity of arras mortar well wrought and prepared, lay a layer of well burnt tiles so as to cover the whole space. This done draw a circle round the pump at the distance of three feet from it every way, and round this draw another circle nine inches wider than the first. Exactly in the middle between these circles, at the distance of six feet from each other, dig holes, and ram in small oaken posts about 2 inches square, and 2 feet 8 inches high; these being well secured, begin to build your cistern of well-burnt nine-inch bricks, cemented with the same mortar in which

you

you laid your first floor of tiles, observing to fill up the vacancies about the posts with the greatest nicety, as well on the outsides, as the inside.

When you have raised your circular-wall to the proper height, which will be about eleven courses, then the carpenter, by means of the upright posts, must secure the top with an oaken-rim 9 inches wide, and 2 inches thick, rounded off at the edges: the whole being thus far completed, the plumber is then to surround the pump with a leaden collar, rising about 3 inches in the neck, and extending about 8 over the tiled-floor. Another floor of tiles may then be laid in arras to come over the first, and cover the lead, and then a third. The fuller of water this cistern is kept, the better it will hold; and by its circular form, a number of cattle may drink at a time, without danger of hurting one another.

The erections on this line will be very moderate. Sheds 164 feet in length, with a nine-inch wall, 12 feet high behind, may be erected, covered in, and furnished with racks for 901. the cistern, with a wooden pump, about 101. in all 1001.

C H A P. IX.

Of the Manner of Planting the Homestead.

THE homestead as I have already said, should be some dry spot about the middle of the farm, and if possible, well supplied with water.

If it be fenced in the manner before directed, the buildings, garden, and orchard, should occupy one angle of it, by which a proportionable part of the fencing will be saved. Four lines of 310 yards each will enclose the whole 20 acres, and about the middle of each of these lines, openings should be left to facilitate the communication, with every other part of the farm.

§2. *Of the Manner of Planting the Homestead.*

Within these lines, at the distance of 40 feet, I would have rows of Dutch elms planted, 24 feet from each other; these in a short time, if well protected, will form an admirable shade in the summer, and shelter in the winter, in which the cattle will take much delight. The great danger is at first from cropping, to prevent which, a dead fence should be run round the inside, at a convenient distance, which will last till the young trees are out of danger. This expence must not be thought much of, when so great a convenience to cattle is in view; and when it is considered likewise, that at the same time that it defends the new planted trees, it will protect also the rising quick on the outer fence, which it is of the utmost consequence for the occupier to preserve entire.

Besides these rows of elms, I would intersperse a variety of other stately growing trees, all over the homestead; such as the chestnut, the walnut, the oak, the pine, the mountain ash, the linden, and if there were any little eminences, the mulberry. These I would plant sometimes in clumps, sometimes in single trees, avoiding, however, the watering-places, near which, I would never have a tree of any kind, because I know that the rotting of leaves in standing water where cattle usually drink, is very pernicious to their health. Near running streams this observation is not to be regarded.

A homestead ornamented in this manner, at a very trifling expence at first, might afford both pleasure and convenience to the occupier, and yield much profit to the land-owner. Trees generally thrive well in pasturages, and in none more than where cattle have a continual resort to mellow the earth with their richest manure. Oaks are observed to grow to an immense magnitude on dry spots in forests, where deer and other animals delight to browse in the winter. It were needless however, to enlarge upon a subject that

is self-evident; my design is not to furnish a complete picture, but only to mark the outlines.

The charge of 1240 yards of fencing, with a nine feet wide ditch, and a mound of nine feet high, will according to my calculation, amount to 56l. four gates with posts, 4l. planting 300 trees of various kinds 30l. fencing off the garden and orchard 6l. planting an acre of orchard, ten yards distance, tree from tree, 5l. in all about 101l.

CHAP. X.

Of the interior Division of the Farm.

IT were easy to lay down a plan upon paper for dividing a farm into fields of regular dimensions; but it is not so easy to carry such a plan into execution. To do this, we must suppose the portion of land we have to divide, a perfect plane, all of one sort of soil, all equally watered, and all equally improveable; a supposition as idle, as it is chimerical. We must therefore endeavour to accommodate our directions to the general order of nature, to correct its irregularities as much as may be, and to render that convenient by art, which in its rude state would be very defective. Much therefore must depend upon the capacity of the surveyor who is employed in surveys of this kind, in judging of the situation, the soil, the condition, and the uses to which the several parcels may most properly be converted. Some general observations, may however be of use to the land-owner, who in occasions of concern should not wholly confide in the judgment of others.

And first, regard should be had, after a thorough survey, to the uses for which the land is naturally best adapted. If for grass, the inclosures should be small; if for cattle delight in frequent change, and thrive much

the faster by often feeding in fresh pasture. If for corn the inclosures should be more extensive; from 10 to 20 acres I account the proper medium. Inclosures of less than 10 acres, lose much of their produce by ill-ploughed head-lands; birds from the hedges, and other annoyances; and inclosures of more than 20 acres are hurtful to cattle in the cultivation.

But another, and more momentous circumstance, should be particularly attended to in the division of a new farm; and that is, the nature of the soil. It is of the utmost advantage to the farmer, to have his fields divided into wet and dry. If his fields are of this complexion, he can at all seasons suit his labour to his circumstances. In dry weather he can plow those inclosures, that are inclining to wet; in wet weather he can stir those that are dry. But if his inclosures lie promiscuously, one part wet, and another part dry, he must then always work to a great disadvantage.

A third observation is no less to be attended to than the former, and that is, to avoid as much as may be, inclosing barren with fertile land in the same field, because they require different methods of cultivation, different manures, different species of grain to be sown in them, and, in short, their whole process of management to be different.

A fourth observation is, the manner by which inclosures may be most properly watered. This is an essential consideration, on the just projection of which the old farmers placed the chief art of enriching and improving land.

These general observations being premised, let it suffice for the present to form a general estimate of the expence of dividing a farm of 500 acres into fields of 20 acres each, and of fencing them in the common manner, with a three feet ditch and a bank thrown up, and planted with quick. This may be done

Of the interior Division of the Farm 55

done upon an average all over England, at two shillings and six-pence a rod, and as there will be found to be nearly 1254 rod, the sum total may be estimated at 319l. 17s.

Having now brought the farm into tenantable condition, it may be proper to bring the whole expence into one view,

	£.	s.
Enclosing and fencing the outer-lines, } 1127 rods, 9 feet wide, 9 feet high, at 5s. a rod	319	17
Planting trees	100	0
Buildings on the south line	450	0
Buildings on the north line	315	0
Buildings on the east line	395	0
Buildings on the west line	100	0
Planting and fencing the homestead, orchard, &c.	101	0
Inner fencing	319	17
50 gates and posts throughout the farm	50	0
	<u>2150</u>	<u>14</u>

The principle upon which the estimate of the buildings is founded, is, by calculating the price of all the materials in the rough, and rating them just double when put together. In erections in which I have been my own builder, I have found this method of computation pretty exact, and may venture to assert, that whoever proceeds upon the same plan, if he meets with honest workmen, will find in plain buildings, the rule hold good. It must however be observed, that in high-finished buildings, this method of estimating, will by no means answer the purpose: In those, the workmanship is three parts at least of the expence.

56. *Comparative View of large and small Farms*

CH. A. P. XI. *Comparative view of large and small Farms.*

LET us now take a view of the necessary expences of a farm of 30l. a year, to which I shall allot only 50 acres of land; so that instead of eight shillings an acre, which the 200l. a year farmer pays for rent, the little farmer must pay twelve. His house shall be as mean as possible, but it must be substantial, otherwise it will be continually wanting repairs. He must have a little cellar, about 12 feet square, underground; upon the ground-floor he must have a good kitchen, for that is the living part of the house, with an oven, and a spare room besides; adjoining to these, there must likewise be a scolding building for a scullery, a pantry, and a wash-house; and above there must be two chambers, and two garrets, for the farmer's family. Such a house built substantially with brick, will not cost less than 200l. He must have a small garden and orchard, planted with apples, pears, damsons, cherries, elderberries, plumbs, and other useful and saleable fruits, the planting of which, will cost 10l. He must have a barn at least 60 feet by 20, with a threshing floor; which according to the former, will cost 100l. A cow-house, stable, cart-house, and sty 100l. Paving in a small yard, 8l. Outer fencing 50l. nearly; inner fencing divided into 8 fields, of 6 acres each, and one of 2 acres for the homestead, 20l.; planting 2 acres with timber and coppice, 15l.; twelve gates and posts 12l.; in all 511. which at legal interest, would bring 25l. 15s. a year; whereas his farm, when let to the best advantage, will only bring in 30l. a year, subject to a deduction of 4l. a year land tax, besides the chance of such a farmer's failing; so that supposing

no repairs, and the rent well paid, the land-owner, in point of profit, might as well give up his land as to build upon it, and let it out in such little bargains, as I have elsewhere observed.

It may indeed be said, that the house may be built for less: Admitting it may be so, it will then be less substantial, and consequently subject to more repairs, which in the end will overbalance the first cost. And if it be further urged, that the buildings I have enumerated, are sufficient for a farm of 50l. a year; I am inclined to believe, that whoever is of that opinion, and will make the trial, will find himself mistaken.

There is a wide difference between building for a tradesman, and building for a farmer. The tradesman wants only a house to live in, and perhaps a shed to exercise his trade, and he can afford to pay a good price for his conveniencies, because his trade enables him to pay his rent; but the farmer must have a great many buildings, besides a house to live in, for which he can afford to pay nothing, because the land he occupies will not enable him so to do. Every one knows, that has any knowledge of country affairs, that farmers of 20, 30, 40, and even 50l. a year, are the most laborious set of men in the kingdom, and might be said to be the most wretched, if wretchedness consisted in hard work, and coarse fare; but habit, and the desire of independence, have reconciled their minds to their stations; and being blessed with vigorous health, the reward of temperance and exercise, they wear the face of cheerfulness and content, and are the parents of children, the flower and the strength of the state.

That the community would receive an additional increase of strength, from the multiplication of small farms, will admit of no debate; but that gentlemen should be expected to multiply such farms, without

58 *Expence of Stocking a Farm of 200l. a Year.*

any view to their own immediate interest; is a hope founded in folly; and therefore unworthy of regard.

C H A P. XII.

Of the Expence of Stocking a Farm of 200l. a Year.

NO part of farming requires more judgment and attention, than properly adjusting the stock upon a farm, to all the circumstances of that farm. A newly laid out farm, will require more culture, than a long occupied farm, provided the long occupied farm has been properly cultivated. But it is not necessary that a new farm should be all cultivated at once. The situation of such a farm, and the demand for the produce, are considerations that should principally be attended to; the nature of the soil, and the scarcity or abundance of manure, either upon it, or near it, are in the next place, objects of no small weight; but above all, the ease, or difficulty of carrying off the produce to the neighbouring markets, is of the last importance. If the new farm is difficult of access, and there is a chance of converting it into a grass-farm, as the expence of stocking it will be less; so if the attempt succeeds, the profits will be more; but if, through the stubbornness of the soil, the poverty of the ground, or the dryness and want of convenience of water, (for cattle will never thrive well where there is a scarcity of water) it may be thought unadvisable to make the attempt, and the only chance that remains, is, to pursue the ordinary arable tract, then it will be necessary to form some plan, that may serve as a foundation, for adjusting the strength to the work that is to be performed.

The farm being now in readiness, supposing at midsummer, and the intended occupier being totally unprovided with every necessary, the first thing he is to do, is, to lay in a stock of provision, for the cattle
he

he is to purchase, and for the family he is to maintain. He must then proceed upon a supposition, that one third of his farm is to be ploughed as soon as possible; one third to continue as he finds it, and one third to be broken up, and if practicable, prepared for a last crop. Throughout the course of the year, therefore, there will be nearly two thirds of his farm, or at least 300 acres, to be ploughed; and if it be remembered that one part of this land must be ploughed at least thrice, he must therefore provide strength sufficient to plough 600 acres, in the course of a year; if he fails of *this*, part of his arable land must remain uncultivated. It must likewise be recollected, that 12 weeks, in the year, must at least be allotted for other labour, when no ploughing can be performed, namely, in heavy rains and hard frosts, even if hay-time and harvest were to be remitted; but these no farmer ever does remit. This 600 acres, must therefore be ploughed, generally speaking, in 200 days, which is 3 acres a day nearly; to do this, three teams must constantly be employed, but whether of three horses or four, or sometimes five and six, that will depend in a great measure, on the nature of the land, of which the occupier must judge. I do not pretend to ascertain the exact strength, only to point out the principle. Twelve horses, however, or a strength equivalent to twelve horses, will certainly be necessary at first. And these may be increased, or diminished, in proportion to the increase, or decrease of employment for them.

As it will certainly be convenient to continue at least 150 acres in grass-land, some sheep will be necessary. Without a right of common, any very large number would be unprofitable; for it should be ever a maxim with the farmer, that one living animal well fed, is worth two that cannot get a belly full. If the waste be dry, part broom, heath, or furze, four hundred

60 *Expence of Stocking a Farm of 2000, a Year*

red breeding sheep, where there is an annual demand for their increase; may be a reasonable stock to begin with; and these may be increased according to the probability of success. Indeed a larger number may be purchased at the times when turnips are plenty, which will enrich the land; and pay for fattening, if no disease intervenes to retard their progress; at all events, four hundred breeding sheep is stock sufficient, where a fold is kept; but where it is proposed to keep no fold, not to employ a shepherd, 200 will be a very proper number.

The number of horned cattle upon an arable farm, should likewise be proportioned to the quantity of grass-land that is constantly kept, not to the quantity of food that may at particular times present itself; and it should likewise be remarked, as to cows, that either such a number should be kept, as to constitute a regular dairy or a suckling-house, and wholly employ one or two servants, or such only as are just sufficient for the purposes of the family; and can be milked and managed by the mistress, or a maid servant. In the first case, not less than ten or twenty; and in the latter, not more than three.

But nothing is more profitable, than the purchase of yearlings, just before harvest, keeping them well during the winter, with the barley and oat straw, when the rowen is eaten up, and selling them off in the spring, when the demand among the graziers begins. Three cows is therefore the most eligible stock, that the occupier of a new arable farm should set out with. Other neat cattle should not be ventured upon, till the produce of the farm can be in some measure known.

In proportion to the cows, should be the stock of swine, two breeding sows are therefore quite sufficient at first setting out; but it may so happen that times and circumstances, may induce the occupier to substitute

future swine in the room of sheep. Certain it is, that where sheep cannot be kept to advantage, swine may; and the contrary for swine will thrive well on clay-lands where plenty of clover is raised, and where sheep will rot; on the contrary, sheep will thrive well on dry barren wastes, with a little additional supply in winter, and there swine will starve. Having now settled the number of live stock, absolutely necessary for the purposes of a new farm of 1001 acres a year, let us next take a view of the dead stock; and, from considering the several articles in the general, as brokers usually do, endeavour to form some estimate of the sums necessary to purchase the whole, that the young beginner may not deceive himself by attempting to struggle beyond his strength, an almost infallible means of keeping him poor all the days of his life.

As in building, fencing, and planting a new farm, the most frugal economy should be observed; so in furnishing and stocking such a farm, the least expensive means of providing the several articles here enumerated should be pursued. These and more than these will be wanted:

1. Household furniture, plain, but neat and substantial.

2. Twelve horses (part mares for breeders) for draught, and one saddle horse.

3. A broad-wheeled-waggon complete.

4. Two narrow-wheeled-waggon.

5. Three carts with ladders, &c.

6. Harness for 12 horses.

7. Ten ploughs, viz. three swing-ploughs, one winged-plough, one turn-ridge-plough, one trenching-plough, one foot-ridge, or rice-plow, and two common-wheel-ploughs.

8. One large roller, and one smaller.

9. Three pair of ox-harrows.

10. Six pair of light-harrows.

11. Barn furniture, of various sorts, including sacks.

Stable

62 *Expence of Stocking a Farm of 200l. a Year.*

Stable furniture, including cart-saddles, halters, &c.

Pick-axes, mattocks, crows, shovels, &c.

Brewing utensils, including copper and putting up.

Three plough-men one year.

Three boys.

Six-labourers.

Weeding, mowing, and harvesting.

Smiths' bill for shoeing, &c.

Collar maker's bill.

One, two, three, or four hundred sheep.

Three Cows.

Dairy-furniture.

Hay for 12 horses till the new farm produces a quantity sufficient.

Corn for ditto.

Manure, straw for fodder, &c.

Market expences.

House-keeping, &c. &c.

Add to the above articles the price of seed of various kinds for 300 acres, to be sown within the year, and the whole sum which such a beginner should be possessed of, should not be less than 1500l. for neither will the farm be overstocked, nor the stock over-rated.

I have purposely omitted speaking of the rent to be paid after the Michaelmas of the succeeding year, and likewise of the charges of grubbing, which must unavoidably happen in a new made farm; however, the bare mention of these articles is sufficient to shew, that many things will occur unprovided for in the estimate which I have exhibited, so that the beginner must not flatter himself that less than 1500l. will suffice. Let him remember, that if he once gets the name of a bad paymaster among his neighbours, it will require many years close application to business to redeem his credit, and that up-hill work, as the phrase is, long continued, will tire the best horse in the farmer's team.

C H A P.

C H A P. XIII.

Of the Servants necessary for the Occupier of a new Farm.

THOUGH the most proper and profitable servants for a new farmer are seldom to be met with, except at one certain time of the year, namely, about Michaelmas, yet it is well known, that servants may be hired at all times of the year in this country; but I would by no means advise my new farmer to engage with such for a continuance, but to employ them occasionally if he enters upon his farm at midsummer or earlier in the summer, till the proper time of hiring, and then he may provide himself to his liking, at such statute fairs as he may think the best servants for his particular purpose are to be met with. In the neighbourhood of London good farmer's servants are rarely to be met with.

Previous to your choice of servants, it is absolutely necessary to determine what system of husbandry you think most for your advantage to pursue. If you intend to vary your scheme of management, from that usually practised in the neighbourhood where your farm is situated, you must endeavour to furnish yourself with servants from that particular county where the scheme of husbandry is common, that you intend to introduce. For instance, if the Kentish, you must endeavour to furnish yourself with servants versed in the management of the various instruments that are in use in that county for the cultivation of land.

In that county, it is not unusual for farms to be divided into three distinct parcels; one arable; one hop-ground; and one grazing land. Servants therefore, that are bred up in such farms, have better opportunities of observing the different effects of the
different

64. Servants necessary for the Occupier of a new Farm,
different methods of culture and other improvements,
than servants bred up on farms where only one branch
of the business is practised.

In Hertfordshire, Buckinghamshire, Bedfordshire,
&c. the land is chiefly arable, and no better plough-
men are to be met with any where, than those, and the
other midland counties produce.

In Norfolk, and all along the eastern coast, where
the land is chiefly light, the ploughmen there are ac-
customed to light ploughing, and would be at a loss
to manage the heavy instruments that are in use in
deep soils.

In the western, and in most other remote counties,
the use of oxen is still retained in the cultivation of
their lands, and whoever would introduce that laud-
able practice into their system, must not think of suc-
ceeding by hiring servants from farms on which no
such cattle are employed for that purpose.

It were needless to enlarge on a subject, the bare
mention of which is sufficient to shew its utility; yet
a few observations on the different practices in diffe-
rent counties may not be altogether useless to the
young beginner.

In Kent, the turn-ridge, or turn-rice plough, is al-
most peculiar to that county. It is a heavy compli-
cated instrument, its beam is elevated to a great
height, and rests upon two strong wheels, about 30
inches in diameter; its share is round and flatted at
the point, and it has a moveable mold-piece, which
by being changed at every land's end, throws the fur-
rows all one way: they have besides a great variety of
instruments for stirring, hoeing, and cleansing their
hop-grounds, which are hardly ever seen in any other
quarter.

In Suffex, it is common to yoke oxen and horses
in the same team, and there the plough most com-
monly in use is the two wheeled.

In Hampshire, the horses for the most part go double, and in strong lands the wheel-plough is generally used.

In Surrey, the Swing-plow is chiefly used, and the horses draw in a line generally three, often four, and sometimes five. This manner of plowing prevails thro' some parts of the mid-land circuit; in others the iron-wheeled foot-plough.

In the eastern division, you may frequently ride a whole day, and see only plows drawn by two horses abreast, with a ploughman to hold the plough, but no driver.

In the northern division, this method is carried still to greater perfection, and you often see one ploughman holding the plough, and driving four horses abreast at the same time.

All thro' the west, oxen are used for draught, as well in waggons and carts, as in the ploughs; but some yoke them single, with open collars and double harness like horses, which is certainly the method in which their power is exerted to most advantage.

There are other particulars, in which the practice of farming differs materially in ploughing, mowing, raking, binding, threshing, and cleaning of corn, and cutting of straw and clover into chaff, and in short, in every article of farming that can be named.

The Kentish men plough their land so dexterously by means of their turn-ridge plough, that no furrows are left vacant, but all their fields that are so ploughed, lie as level to appearance, as if dug with the spade, and levelled by hand; they likewise mow their oats and barley, by means of their cradle scythes, with such neatness, and lay the ears so perfectly even and smooth, that men afterwards rake and bind them up in shaves in as handy a manner as wheat reaped with the hook or sickle: this they do likewise with their beans and peas, by means of instruments called

hooks and hinks, contrived for cutting and laying them down even; so that a Kentish farmer will carry as much of what is called lent-corn in a day, with the same strength, as is commonly carried in other counties in two. Add to this that, these different sorts of grain, thresh much better so bound, than when they are housed or ricked promiscuously.

In that county too, they clean their corn much better, by means of their wind-fans, than they do in counties where the barbarous custom of throwing their corn is still in use; and in cutting out hay, and trussing of straw, there are some so expert, that loads are made up without weighing, which if brought to the test would not vary 14lb. weight in eighteen hundred; whereas in the west country, they hardly know how to truss a load of straw.

Other counties have their peculiarities, as well as Kent; and some their excellencies. The Chiltern and vale farmers, have their ploughs of constructions so very unlike each to the other, that their hands lie as different in appearance, as the instruments with which they are cultivated. The vale-man hardly knows how to use the chiltern-man's plough; nor does the chiltern-man chuse to work with the vale-man's. Indeed in Aylebury vale, I have been lately told that double-ploughs are now in common use, and are brought to such perfection, that they are worked with as much ease as their common foot-ploughs. By the addition of one horse they do double work, and are made so as to suit almost every soil. A servant that has been accustomed to the use of such a plough will in many counties be a valuable acquisition. This plough has been long known, and if my memory does not fail me, was invented by Ellis of Gadderden, who aimed at a rivalry with the late celebrated Mr. Tull, but being an illiterate man, tho' a good farmer, pretended to many inventions, that were either

ther variations from that great master's improvements, or rude conceptions deduced from no certain principles, and of course very imperfect: He also pretended to be master of many valuable secrets, which he often promised to discover, but never was so good as his word.

Another plough they have in use in the north, which is almost wholly unknown in other parts of the kingdom, and that is, the winged plough for breaking up of pasture-lands; this plough may be used for two purposes, *one* for cutting up the swart, and turning it over for a succeeding plough to follow in the same tract, to cover it with the mold; the *other* for denuding, that is, for casting up the swart in thin turfs, in order for burning; a practice much in use in some countries, and not so absurd as speculative writers affect to represent, as will be shewn in its place. A servant that has been accustomed to the use of this plough, would be of great use to the occupier of a new farm. It is not enough to be in the possession of new instruments, servants skilled in the use of them, will take pride in shewing in what they excell; whereas others will affect to despise them, because they are totally ignorant of the method of handling them.

No servants will be more advantageous to the occupier of a new farm, than those, who are well versed in the culture of turneps. To undertake to teach a new set of hoers, would be as difficult a task, as to invent new instruments to do the work without hands. Whoever has not been accustomed to hoeing of turneps, trembles at the destruction of so many fine plants, and the farmer himself, must be a philosopher, if his knowledge is only from hearsay, to be the spectator of so much havock to his rising crop; yet, in this article, contrary to almost every other, the more waste you make, the richer you grow; and you

can never remove at the first hoeing, a number sufficient to render a second, and even a third unnecessary. Servants therefore well versed in this branch of farming, are indispensable.

Plowmen abound every where, but few that really excell; those who have travelled most are generally the best; but they are all apt to be conceited, and if put out of their way, are more intractable than their horses. Their best recommendation is, the neatness of the land in their last places.

Taskers will not be wanted by a new farmer, till he has raised corn to threth; but no servants are of more consequence to him, when he has. Such servants should not only be very capable, but very honest. It is impossible that the master's eye can be always over them, and if they are so disposed, they may connive together, and cheat him to a great amount.

If the new farmer intends to keep any number of sheep, he must, if not a professed shepherd, have a servant who has been used to live where sheep were kept: He must not trust too much to his own management in any thing; for he is but one, and he will have enough to do to direct and keep in action those who are already taught, without the trouble and fatigue of having many to teach.

A tractable set of lads, in proportion to the number of ploughs that are to be kept, must likewise be provided, and it will be well in this idle dissipated age, if such a set of lads comes to a new farmer's share. They should be sturdy boys, able to assist in cleaning and feeding the horses, serving the pigs, and giving a helping hand at all times when work is to be done. It is bad policy to have little children to train, yet somebody must have the training of them, and that was the reason of the old law, which obliges every farmer to take a poor child apprentice.

Odd men, and day-men, will be absolutely necessary about a new farm, more than about any other, especially till the fences arrive at perfection. Perhaps wood-men too may be wanting in the winter, but these are almost every where to be had, but not at all places upon the same terms. The custom of the neighbourhood, however, will determine that point; for by that the new farmer must be governed, as well as the old. These men indeed are very apt to impose upon strangers, but that imposition ceases of course, as soon as the farmer ceases to be a stranger. The class of women servants, about a farm-house, require no less attention in hiring than the men. I would by all means caution the young farmer against hiring his women servants from gentlemen's or even tradesmen's places. The business at a farmer's is so totally different from the business at either of the others, that a maid who has lived with the latter, will be always complaining of the hardships she meets with at the former, tho' the farmer's business will be but half done. Let this be the farmer's rule, to endeavour to hire his women servants from places of harder work than his own: he will then have his work chearfully performed, and those he employs will be well contented.

Before I close this chapter, it may be necessary for the information of those who have not been bred farmers, to say something of the nature of the different employments, about which the farmer's servants are usually occupied, and what they generally are understood to undertake when they are hired.

Indeed if more is expected of them than is common, it requires no small presence of mind to recollect what other work will be wanted to be done, than that which they have been generally accustomed to do; and particularly to stipulate, in making an agreement with them, that they shall fulfil their bargain.

And *first*, of the ploughman. If he is hired without a special agreement, the business he will do is to hold plough eight hours a day, that is, from seven in the morning till three in the afternoon, whenever the weather permits.—At hay-harvest ; to act as head-man, in mowing and leading on the rest of the company.—At corn harvest the same, in reaping wheat or mowing of barley or oats.—In the snowy and frosty seasons, when he cannot plough, he will drive the team, or dung-cart, and when corn is to be sold, he with his team will carry it to market ; he will likewise attend at the smith's shop in shoeing his horses, and pointing or fitting the share of his ploughs ; but he will neither go into the barn to thresh, nor into the garden to dig, nor into the brewhouse to brew, nor will he do any thing distinct from his horses, except perhaps mending of sacks ; and, if he is head-plough-man, and is thoroughly master of his business, he will require a helper ; that is, a sturdy-lad to help to feed, clean, and harness his horses, and to attend upon him at market ; also in plowing, carting, mowing and reaping. It is therefore necessary at hiring, to insist on his felling trees, plashing hedges, faggoting, threshing, digging, brewing, or any other sort of work that may be wanted about the farm ; provided the occupier expects those services from him.

But a complete ploughman, who knows the nature of all sorts of land, how to manage it, and what it will produce, will seldom or ever come into such an agreement, because he is sure never to want employment.

Inferior ploughmen, may be hired upon these terms ; but little dependence is to be placed on their performance of any thing well, who undertake to do every thing.

Next to the ploughman, the thresher may be ranked. It is expected that this man should thresh 24 bushels

busbels of wheat in a week, and clean it for the market. Twenty-four busbels are here rated only as a medium, for when wheat yields well, 30 busbels is an easy week's work; but when ill, 20 is hard to be accomplished. Threshers in large farms generally work in pairs, and when corn is to be cleaned with the wind-fan, the master finds an additional hand to turn it. Some threshers will do their task in five days provided they are allowed the sixth to themselves, but such threshers are not very common. Of other corn, 40 busbels of oats and barley, or thirty of beans and peas weekly, are the ordinary tasks required to be done at hiring a professed thresher. This servant will likewise scruple to do any other work than threshing, except at hay-time and harvest, unless particularly hired so to do; and therefore it is necessary to agree that he shall assist at filling and spreading dung, supply the cribs or racks with straw night and morning, and if it be necessary, help at milking, or any other business that may require his assistance. Some keep no threshers in the house; but hire their threshing: the common prices are, three shillings a quarter for wheat, one shilling for oats, and sixteen pence for barley.

Next to the thresher, is the shepherd, where a flock is kept. A shepherd seldom does any thing else besides attending and feeding his sheep, unless at shearing-time, and then if he can shear, he is one of the number, if not, he must wait upon those that can, and wind up their fleeces. A complete shepherd ought to be master of many remedies adapted to the many disorders to which sheep, above all all other animals, are subject; otherwise numbers of sheep may be lost in a season, for want of skill in the person that is hired to look after them. Farmer Ellis accounts a lame shepherd and a lazy dog the best attendants on a flock of sheep, because they are least likely to harass and fatigue them.

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The odd-man, is one of the most useful servants about a farm-house. He is kept by most farmers in most countries, and his business, like that of the women's, is hard to be defined. His employment, in short, is helping to do every thing that wants to be done, and his proper master and mistress are every body who have more work upon their hands than they can do; he fetches wood and water for the maid, heats the oven and copper, helps in milking the cows, churning the butter, and in making cheese; he serves the swine, suckles the calves, goes on errands, mends the hedges, minds the saddle horses, looks after the garden, and gathers the fruit. He is indeed every thing to every body, and must be a good natured man himself, because he has every body else to please.

The ploughman's-helper, is the lowest servant the farmer keeps. His business is to rise in the morning, and to look after the horses before the head ploughman gets up. He begins by feeding, currying, and getting them in readiness for watering: he then assists the ploughman, in watering, and in harnessing; and leading them out to plough, in driving the plough, and sometimes in ploughing, to make himself master of the art. He helps in harrowing, carting, and carrying out dung. He accompanies the team to market, and at hay time and harvest goes next to the ploughman, who in every respect, expects in boarding him and paying him his wages, acts as master over him, and, if he behaves well, takes his part, and defends him upon all occasions of dispute, and suffers no other servant to impose upon him, or use him ill in any respect.

Among the day-men employed by a farmer, are woodmen and grubbers; the latter will probably be much wanted by the occupier of a new farm, the former but little. The grubber's business is to break up the stubby ground, and clear it for the plough, which

which they generally do by the rod, perch, or pole of $5\frac{1}{2}$ yards square. Their price, by the perch for breaking up the ground, is from 8d. to 1s. If roots of large trees are among the stubbs to be grubbed, their price is from 5s. to 6s. a stack or cord of 12 feet long, 3 feet over, and 3 feet 8 inches high for the cord-wood, that is, for the roots cloven to a portable size; 2s. a stack for round-wood, that is, for branches of 1, 2, or three inches diameter, cut uncloven to the width of the stack; and from 2s. to 2s. 6d. for the spray, that is, the small roots and fibres, with the knobs of the stubbs intermixed. These prices are over and above the allowance for breaking up the ground. In this business the men generally employed, should be well looked after; for they are very apt to flogen the stubbing to the great damage of many a plough.

Woodmen have their settled prices, as well as the grubbers, and they are regulated by the custom of the country: but it is seldom that farmers have much to do with these men, and therefore I forbear at present to enlarge upon the various rates of their different branches, only that for baker's bavins, which are wholly the produce of the hedges in old farms, their price is from 2s. 6d. to 3s. a hundred of six score, and for faggots from 1s. 6d. to 1s. 9d.

There is still one man more, almost constantly employed by the farmer in the winter season, and that is the hedger. This man during the season, seldom wants employment, and generally works by the rod; his price is in some counties 4d. a rod, and in others 6d. for making the hedge and scouring the ditch. If the stakes and bushes grow on the spot he cuts them without any additional pay; but if they are to be brought from any distant part of the farm, he expects that to be done by his employer. They generally are guilty of a very great error in making their dead hedges,

hedges, if not particularly cautioned against it; and that is, in filling up the bottom with the small sprays, which they bundle up together, lay them flat upon the ground, and then drive their stakes thro' them, and this they call bottoming. These sprays soon rot, and then the bottom of the hedge in which the security of it consists, becomes an open thoroughfare for all sorts of vermin, hogs in particular. In hedging the farmer should never spare bushes. His stakes should be cut in the proper season; they should be well driven, and well ethered, and the strongest bushes should be placed at the bottom.

In many places they hardly know what a dead hedge is, their fences are stone walls or live-hedges; that is, growing wood of one kind or other, which at certain times they cut down and fell for firewood. Plaising then becomes necessary, that is, cutting with a bill those shoots that are left to make the hedge; this they do about half way through near the stub, to make them bend, and then they work them close, and lay them as they please. A hedge thus plaisied about 30 inches high, costs from 3d. to 6d. a rod, with the mould thrown out of the ditch to the roots.

C H A P. XIV.

Of the choice of Cattle for a new Farm.

IN the foregoing chapter, I have spoken in general of the choice of servants, in this I shall with great deference offer my advice in the choice of cattle; and as horses are not only the most useful, but also the most valuable, the new farmer should be the more careful in the purchase of them.

In the first place, he should have regard to their height. Horses of unequal height, can never exert their
their

their whole strength in the same team. On the contrary, they hurt and fatigue and wring one another exceedingly, let them be ever so carefully driven, or their harness ever so nicely adjusted.

In the next place, let them be coloured and marked alike. It gives a young farmer credit to see his teams of horses nicely matched. They will cost him not a penny the more. If he is to purchase his whole stock at once, let him not trust to dealers, but let him take the chance of the most noted fairs. And let him be sure to observe the following particulars.

Let him take a full view at once, of the **WHOLE HORSE** he would buy, and if he sees nothing offensive to his eye in the entire figure, let him then proceed to examine the parts. But if he should happen to dislike the shape at first sight, let him look at the same horse no more; for be assured of this, that a young horse will never look better than out of the breeder's hands. If he is lank and lounging, the breeder will tell you he will fill and grow lively; if low before, that he will rise an inch or two; if foul limbed, or flat sided, cross made behind, or dull eyed, if you will believe him, all these faults will leave him as he grows older. Trust him not; but look round. When you like the shape, talk then about the price; if that too pleases you, examine the eyes, if they are lively but not wild, it is a promising sign of a good horse. If they are wild, be assured he is vicious, and a vicious horse is a dangerous inmate: from his eyes descend to his hoofs; if they are flat and spreading, and of an oyster-like shape and colour, look at him no more; but if they are high, and hollow, of a shining bright healthy horney colour, be assured of this, that he is sound footed; ascend gradually, mark well his patterns, if they are short and upright, it is a sign of strength: but be sure you mark the hair that surrounds his hoofs; if
that

that lies smooth and thick it is a sign of soundness ; but if thin and strutting, and the skin not well covered, he either has had, or will have the greese ; next observe his fetlock joint, if that is round and full, and not too gouty, so far you will be safe ; his legs are next to be examined ; if they are flat and bony, it is a sign of strength, an ounce of superfluous flesh between skin and bone upon the leg of a horse, lessens his value an ounce of gold ; if his knees are long and round, and his thighs thick and brawney the better ; if they spread before and behind it will be no fault, so that his feet when he stands upright are close and firm ; let his chest be wide and tapering quite to the top of the shoulder blade, and falling gradually back on each side till the blades of the shoulders meet in a point ; from the shoulders let the neck project, rising as it goes till it meets the head, not as if stuck in between the shoulder-blades, but growing as it were all of a piece from them ; if his ears are round and thin, his jaw-bones wide behind, his forehead broad, his nostrils full, and his mouth mealy, he will be so far likely enough to answer the buyer's purpose ; add to all these points, that if his back be streight and short, his body round and full, his ribs broad and well bowed, and filling the chine from the shoulders to the huckle-bone, his buttocks broad, and his tail bushy, with the hair large and strong, his age from four to seven, his colour black, his forefeet white, his forehead starr'd, and his height about $15\frac{1}{2}$ hands ; such a horse at the present rate of horses will be well worth 18 or 20 guineas.

To know his age, it is only observing the last tooth in his under-jaw. As that is the last tooth shed, it is always the least and whitest till the horse comes of full age, and then no difference can be discerned, but all seem even alike. It is then said, he is full mouthed, which is the same as to say he is full aged, or arrived

at his full strength. As a horse grows old, his upper teeth get long and project over his lower; but some horses will carry a fair mouth till they are twenty. Some jockies will file the teeth to give the horse a fair mouth, if he is a valuable one; but an old horse has always a deep hollow over his eyes, which the jockies likewise endeavour to conceal by making a puncture thro' the skin, and blowing their hollows up; but notwithstanding all these arts, an old horse is as easily known to those that are conversant in them, as an old man.

The next valuable species of cattle is the horned, and of horned cattle, oxen, and cows. If oxen are my young farmer's choice, let him purchase those that have been trained to the plough, for it would not be easy for the best ploughman who had been all his days accustomed to follow oxen, to train a whole team at once to that laborious work. An ox for the plough, should have shoulders large, broad, and deep, his ribs broad and well bent; his back straight, his thighs round and full, legs straight and short jointed, hoofs deep and hollow, horns wide and spreading, skin thick, and his hair smooth and sleeky; such an ox will cost from 15 to 18 guineas, provided he is 13 hands high, and no more than 4 or 5 years old.

Though I esteem oxen more beneficial than horses in deep soils, yet I can by no means recommend them generally. I have not so contemptible an opinion of my brother farmers, as to suppose that they would be so blind to their interest, as wholly to reject them, if they were of equal or superior advantage to them in the cultivation of their lands. No set of men in this kingdom understands their own interest better than the class of farmers, and no men are more tenacious of it. To accuse them of an obstinate perseverance in old practices, is unjust; and this very article is a proof of it. Oxen were universally in use in
old

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old times, and now the use of them for draught is almost as universally laid aside.

The cow differs much from the ox; she is valuable; not for the labour she is to perform, but for the milk she is to yield. A full fleshy cow, is seldom a good milcher: Many people are particular in the colour of their cows; and if of the large Lincolnshire breed, prefer the red: Of the small Welch or Scotch, the black; but a good cow can never be of a bad colour. I have observed, however, that among the middling sort of cattle; those cows are the best milchers, that are neither fat nor lean. I prefer those with curved horns, like the horns of the moon; to those with wide spreading horns like those of the Ox; and those that have large broad foreheads and thin necks; to those that are pin-headed; as the phrase is, and bull necked; a round carcase, to a deep one; and a moderate thin leathered bag, to a large fleshy one. Some are curious in observing the milk-vein; and if that be large, they conclude she will give a great deal of milk. Cows should have clear round teats, neither too large nor too small; and they should be gentle and easy to milk. A young farmer should buy all his cattle in young, because if any should turn out bad, notwithstanding all his care and precaution, he may then stand a better chance of parting with them; to the least loss.

In your choice of sheep, nothing requires greater nicety. The breed of sheep differs much in different counties. In Herefordshire the sheep are small, fine woolled, and are very delicious meat; Buckinghamshire, Warwickshire, Northamptonshire, and Leicestershire produce sheep of a large size and shape. In Lincolnshire the largest sheep in England are bred, and from thence are propagated a fine breed all over the North, even to the remotest parts of Scotland. On Banstead Downs, the sheep are small, but well woolled

woolled, and the mutton well flavoured. In the Isle of Wight their sheep are of a middling size and their wool and flesh in good repute. But the West country, those bred on the plains of Salisbury, the Hampshire, and Devonshire Downs, &c. supply almost all the Southern counties, as Lincolnshire does the Northern. They are of a middling size with white faces, white and short legs, broad loins, and fine curled close and thick wool. One rule in the buying of sheep should never be departed from, and that is, always to buy them from a worse soil than a better; but what is still of more consequence is, to be sure to examine the soil from whence you buy your sheep. Those who are best skilled in the purchase of sheep, never depend upon those brought to fairs; they travel to the breeding counties before they buy, and examine the several lairs of the breeders. On that depends the soundness of sheep; for many times sheep purchased at the most noted fairs, are tainted with the rot, and when that is the case, they die apace when they come into rich pasture. Young ewes may be purchased at ten guineas a score in the West-country, and there I would advise my young farmer to purchase his stock.

It were unnecessary to speak of swine; they are to be purchased every where, the large and the small, and there is very little danger of being deceived in the purchase of a breeding sow or two.

C H A P X V.

Of the Instruments most proper for the Cultivation of a new Farm.

I know of nothing that does so much honour to the Society of arts, as the encouragement given to the ingenious mechanics, for the improvement of the instruments used in the cultivation of lands. This en-
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couragement has been productive of a vast variety of new inventions; some of them proper for soils of one kind, and some for those of another, inasmuch, that soils of any kind may now be cultivated, at a much less expence, than ever was thought possible before those inventions were discovered.

It is, however, not a little mortifying, to mark the slow progress which is made in the introduction of those instruments, into common practice. Who is there that can now see without concern, a man toiling and sweating, and with infinite labour shoving before him a paring-iron, and undertaking the arduous task of turning up the surface of a large field by pieces of two inches thick, and eight inches square, when a plow is invented, that by means of a horse or two will turn as much in a day, as that man can do in seventeen, and to better effect; yet nothing is more common, than to see such men paring off the surface of barley-stubbs in Oxfordshire, Worcester-shire, Gloucestershire, and almost every other inland county; and turning it over about Michaelmas, with a view to kill the quitch; an attempt as fruitless, as the labour itself is ridiculous.

Can any thing be more absurd, than to continue this practice, in counties where almost all their new-broken-up lands are pared and burnt, before they are plowed and sowed; but so it still is.

The trenching plow is another highly improved, and useful instrument, which, though a discovery of more than an hundred years standing, is yet but lately improved, and partially introduced in a very few places.

The double swing-plow, is a third very expeditious instrument, and yet, in all the counties through which I have lately passed, and I have been in many, Buckinghamshire is the only one in which I have seen it at work.

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The Margate-hoe, for hoeing of beans, peas, cabbages, &c. is but very little known, and yet it is a most useful invention.

The engine for slicing of turnips, though one of the most simple, as well as the most useful instruments in the farming business, is yet but in few hands.

The spikey-roller for cleansing of foul lands, is hardly to be met with, though by its bearded spikes, it draws forth more strings of quitch in a day, than an hundred pair of hands, when the land is well loosened by the plough.

I forbear to speak of drill-ploughs, except that for drilling of pease, and horse-beans, which are the only sorts of grain that I think can be generally drilled with any certainty of success. At least they are the only sorts that I would advise the young farmer to begin with.

An engine for threshing corn has lately been invented; the model of which, I am told, remains in the Society's room in the Strand, without being copied at large.

There is still another instrument for winnowing corn, that deserves the greatest encouragement, and exceeds the winnowing fan now in use, as much as that exceeds the casting method still practised in the Chiltern countries.

Of these instruments, I would particularly recommend the winged plough for turning the turf. The swing-plough, and double swing-plough, the trenching plough, a turn-ridge foot plough, a pease drill plough, and a hoe-plough; the spikey roller, the winnowing machine, and the machine for slicing turnips.

A chaff-cutter the young farmer must not be without, unless in counties where chaff is cut at a shilling a day, and sixty bushels is the usual day's work.

I do not think much of the heavy Kentish turn-ridge wheel plough, as in most lands the foot plough

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of half the expence, and worked with less than half the strength, may do as well ; and the long catalogue of other ploughs, may all be supplied with the neat, light, simple, and easily managed swing-plough; which, for the general purpose of ploughing in all ordinary soils, exceeds in my opinion, every other plough that has yet been invented.

I greatly disapprove of multiplying instruments for the farmer's use, that are of no real advantage. When they are once or twice tried, they are generally thrown aside, and the ploughman has recourse again to his old instruments. I have myself a great variety of ploughs, but none that my ploughman, who is an excellent workman, chuses to handle like a swing-plough. The two-wheeled Oxfordshire foot-plough, in the use of which he was trained up from his infancy, he has totally discarded, since he has lately accustomed himself to the swing-plough. The double plough upon the same principle, where the land is light, I am persuaded, must be a very great improvement ; but as I have no such light lands belonging to my own farm, I can only recommend it to those who have. The swing-plough seems to have been but little known in Hertfordshire before farmer Ellis introduced it into that county about the year 1740. His account of it is, “ that it works in light and
“ clean order both for horses and ploughmen in any
“ sort of ground, and is the most general plough of
“ all others for ploughing in all grounds, except in
“ fen and marsh lands; and in stony lands ; soils
“ that require each a particular sort of plough for it-
“ self.” He calls it a new invented plough, and probably it may have been so esteemed by him, who claimed the honour of inventing every instrument, the construction of which was new in the neighbourhood where he lived. Tho’ he seems by his writings to have been a kind of quack in agriculture, and a pre-
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tender to many nostrums, yet there are a multitude of curious observations dispersed thro' his writings well worth the notice of his less experienced brethren.

C H A P. XVI.

Of different Soils, and the Manner of cropping them.

HAVING given in the foregoing chapters, some general directions for stocking a new farm, and providing servants to cultivate it, I shall now endeavour to point out the different soils that may reasonably be expected to be found in it, that the occupier may know before he begins to work upon it, what inclosures are most likely to answer his purpose on their first breaking up.

Some writers of eminence, have endeavoured to reduce the different soils that are to be found in different parts of this kingdom into distinct classes, and to distinguish them one from another by certain essential properties, which nature has assigned to each; but these properties, being discoverable only by processes with which the farmer must, as a farmer, be supposed to be totally unacquainted, I shall beg leave to depart from this physical method of arrangement, and endeavour so to distinguish them, as that the common farmer may know which is meant when he sees them exposed to his view by the operation of the spade or the plough.

If he to whom the survey of the new farm is entrusted, should happen to be a person of experience, he will be of great use in assisting the occupier in this particular. While the ditches are digging, he will have frequent opportunities of observing the different strata thro' which they are cut, and of making observations on the nature of the earths, of which those strata are compounded. These observations may be

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of great use to the farmer, by directing his choice to such earths, as by being properly mixed, assist one another in promoting vegetation.

What I have now to lay before him, is only a few cursory hints that may be of use in directing him to begin his course of husbandry with such inclosures, as by the appearance of their upper soil, promise the fairest to reward his labour.

All writers agree that the richest soil which this island affords, on being turned up by the spade or the plough, has much the appearance of earth fresh turned up on a mole-hill. It is sometimes of a blackish, and sometimes of an auburn colour, always moist and always crumbly, never wet, nor ever gluey, almost always of an equal temperature, never hot, nor ever cold; to which admirable quality, its fertility may, I think, be reasonably attributed. To follow the cattle, when soils of this kind are ploughing, especially after gentle showers, is both healthful and grateful, yielding a kind of balsamic odour, pregnant with many medicinal virtues. On this soil, the farmer may safely make his first tryals, and he will not be disappointed of a crop. Frequent stirrings, with careful and effectual hoeings, are all that are necessary for the improvement of this soil, which is naturally of itself so full of vegetable food, as to want but little addition from art. The farmer, or grazier, who is so happy as to occupy land of this quality, may be said to be possessed of a mine of wealth, more valuable than mines of silver or gold, because equally profitable, more easily work'd, and more inexhaustible.

What I mean seems somewhat different from that crumbly clay, which Mr. Young describes in his *Farmer's Guide*, and which, he says, of all other soils is the best. What I have described, has however, all the properties which Mr. Young ascribes to his crumbly clay. It will, as he observes, "if well ploughed

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ploughed and water-furrowed, lie perfectly dry in the winter, and you may walk over it after rain without clogging your shoes. You may plough it at all seasons, and it will always break up loose and mellow, and it is easily drained, &c."

But what I mean never wants draining, unless overflowed by waters that flow upon it from higher grounds than those where it happens to be found. I have never discovered any mixture of clay in its composition, nor have ever found a crumbly clay totally divested of its adhesive quality, or so much so as not to clog the shoes after moderate rains.

The next best soil to the former, I account the hazely or marley soil. This soil differs essentially from the former, both in colour and quality; but it agrees with it in a great measure in richness and fertility. In the Rodings of Essex, much of this soil is to be found; in the Vale of White Horse, in the Vale of Evesham, and in the Vale of Aylesbury. Those extensive tracts abound in corn of the very best quality that Britain produces; but they are deep countries, where, in rainy seasons, it is uncomfortable travelling, and therefore more occupied by farmers, than inhabited by gentlemen. On the former soil, you may walk over the ploughed lands, and the earth, as has been said, will hardly soil your shoes. On this, if you walk after rain, you will be in danger of losing their soles. The former turns up of one uniform colour, black or auburn; the latter, to use a familiar figure, of the colour of marley beef, after being a while exposed to the air. This too, like the former, wants but little enrichment, except from the atmosphere by means of the plough or the spade; but it is more nice and critical to be managed than the rich black soil, of which I have already spoken; for tho' after being mellowed by frost, or meliorated by gentle rains, it turns up crumbly and works pleasant, yet,

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were it to be ploughed in a rainy season, it would cling like mortar ; and, if sowed in such a situation, would produce little or no increase. Those therefore who occupy land of this quality, must carefully attend to the proper season, and rather plough seasonably than frequently. This soil is likewise more subject to weeds than the former, and for that reason requires more frequent fallowing ; but if the occupier of a new farm meets with a soil that answers this description, he may mark it likewise for his first essays.

The stiff clayey soil is of all others, the most stubborn to be wrought upon ; and yet it is more general throughout this island, than any other. It needs no description. Tho' there are various kinds of it, they are all well known to the farmer, to whom it is of little consequence to be informed of the specific difference ; the only knowledge of use to him is what kind of manure will fertilize it most, and reduce it to a tolerable state of cultivation ; and this seems to be clearly ascertained, as far as one single experiment can ascertain it, by Dr. Home, in his *Treatise on the Principles of Vegetation*, who, having prepared five pots, one of pure clay, one of clay mixt with marle, one of clay mixt with dung, one of clay mixt with lime, and one of clay mixt with sand ; he planted six seeds in each, and at the end of four months, upon examining their produce, found those planted in marle the best, those in dung next, and those in lime tolerable ; but those in the entire clay, and clay and sand, were withered ; from whence he concludes, that marle and dung are the best manures for clay, and that lime may be good, where the former cannot reasonably be procured. Sand, the Doctor wholly explodes ; yet, where drift-sand mixt with the fatty substances that commonly accompany it from the runn of public roads, is to be found, as in the lodgement of ditches, &c. there can be no doubt but it will answer

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swer very well if laid upon clay. I have tried it in my garden, and been a witness to the good effects of it.

Chalk the Dr. made no trial of, because it does not abound in his country; but chalk laid upon clay in large quantities, as 25 loads to an acre, at the proper season, well broken and exposed to the action of the frost in the winter, and, when *runn*, well spread about, exceeds all other dressing, as I myself have experienced. The new farmer, therefore, if he is possessed of those distinct substances, clay and chalk, may apply the one to mend the other, and the sooner he begins the sooner he will reap the benefit.

It is, however, a mistaken notion to mix chalk with dung, to enrich it, as is commonly done by those who do not sufficiently attend to the properties of chalk, which are to open and warm; and thereby to correct the natural tenacity and coldness of the clay; for clay never wants moisture even to the bottom of its bed, if that bed be ever so deep, as every winter's experience shews; for expose a bed of clay ten feet deep to the action of a severe frost; and so far as the frost happens to penetrate, the clay will crumble like the finest mold. The moisture within the clay congeals, and being again dissolved, the particles of the clay that were sustained by it, having lost their support, fall to pieces and sink from the foundation like a heap of ruins. Heat and moisture therefore being the two grand instruments of vegetation, as has before been shewn; chalk and clay properly combined, are by that combination endowed with the greatest fertility.

The hazely, or marley soil already spoken of, is no other than the natural combination of these two bodies, and the nearer we can approach to this mixture, which nature has pointed out for our imitation, the nearer we shall arrive at perfection.

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The method which many farmers take to mellow their chalk by mixing it with dung, has, however, this good effect, that it covers it from the action of the summer's sun, than which nothing is more prejudicial to chalk; for being dug from the pit in the summer, and exposed, as is the common practice in some places, to the open air, it loses that soft saponaceous mellowness that is essential to its *running* in the winter. For that moisture by which it is softened, being exhaled by the sun's rays, it becomes a hard stubborn dry impervious substance, as impenetrable by frost as the hardest stone.

I have dwelt the longer upon this article, as I know of no author that has considered the properties of chalk as conducive to vegetation in this light, and yet I am persuaded by my own experience, and by what I can learn from the experience of others, that what I have here advanced will be found to answer wherever it is introduced. About Michaelmas, or as soon after as the farmer's convenience will permit, is the proper season to lay on your chalk, and the softer it is when laid on the better. Break it well and let it lie the whole winter exposed to the rain and the frosts, and as it runs spread it, still leaving the undissolved lumps exposed to the future frosts till the winter is over, and then plough it in when your clay-lands are mellow. If you then miss of a crop for many succeeding years, provided you watch the proper season for sowing, all my experience may be accounted useless. On the contrary, if but this one article is found upon trial to deserve the farmer's attention, my pains in writing this little book will not be wholly in vain. I know that former writers have recommended chalk as a dressing, but they have not investigated its properties, and farmers use it improperly because they know not how it acts.

The chalky soil is as strongly marked by nature as the clayey soil, and is as well known to the farmer.

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As what I have said therefore in the former article is equally applicable to this, I shall not repeat here what I have above so largely discussed; it may however be necessary to add, that as chalk is abundantly the best dressing for the clayey soils, so clay is undoubtedly the best dressing for chalky soils. But when I say the best, I would not be understood to mean in exclusion to all others, nor even to give it the preference to dung or marle for several *successive crops*; on the contrary, either of these, and the former in particular, may do more, and cause the soil to produce much greater crops for one or two years than the chalk; for dung is apt to exert its warmth vigorously at first, and to expend its heat much more suddenly than chalk, and consequently to lose its vegetative virtue sooner, and become a mere *caput mortuum* or useless lump; whereas chalk, possessing within itself the principles of fire, incommunicable to artificial composts, acts in a more uniform and gentle manner, and were it not, by length of time, to sink by its own weight below the action of the plough, would possibly continue its vegetative force, like the power of the antimonial cup, a thousand years without any sensible diminution of its substance; but this I offer as a probable conjecture upon the credit of genuine information, that the good effects of chalk are manifest where it has been properly managed till every trace of it is obliterated. I would however by no means be understood by preferring chalk, to exclude marling of clay lands; both are powerful agents, and both may be assistants each to the other, where both are to be found readily, and either may be used with good success where the other is wanting.

The sandy soil, like all the former, is so well known as not to be mistaken; but as the soils of pure sand are seldom cultivated, the natural mixtures that are found abounding with them, give them sometimes a
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fertility equal in many respects to the richest soils. These soils are most frequent near the sea coasts, and where they are found deep and strongly impregnated with black, brown, reddish or brick earth, they produce immense crops. I say most frequent, tho' vast tracts are to be met with in the inland counties.

The author of the Farmers Letters, a writer of the best authority, advises these soils to be first sowed with carrots, then buck-wheat, and after that with burnet, which he advises to be continued till it comes to a swart; and then to be stocked with milch cattle. If my new farmer should meet with such a soil, and should not be inclined to follow the whole of this process; as in truth I have myself been discouraged from sowing burnet by three unsuccessful attempts to raise it; I would advise him to make trial of, and to continue the carrot culture, recommended as well by Mr. Young, as by the society of arts, and successfully attempted by Mr. Billing; and by several other gentlemen in smaller quantities. The advantage of carrots above any other root, is, that horses will eat them and grow fat upon them; and that oats are unnecessary while carrots are continued. This is confirmed by experiments in France, Germany, Switzerland, and by gentlemen of undoubted credit in England.

As nothing enriches land more than folding upon it, and as sandy soils are by reason of their dryness most proper for that purpose, the farmer who folds the most, in addition to what is before recommended, will find his labour the best rewarded. With respect to the culture of carrots, that shall be amply spoken of in its proper place. If the young farmer has carrots in view, he should begin in autumn to break up his sandy lands that the swart may be well rotted in the winter, and the inclosures allotted for the trial be brought to a good tilth early in the spring.

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Turneps, carrots, potatoes, and it may be, madder, may in these soils be cultivated to great advantage; and where clay and dung can be had in plenty, they may be artificially enriched to a very great degree. One advantage they possess above all others, that they are cultivated at half the expence of other soils; a man with a plough drawn by two horses will in these sandy soils plow a greater quantity of land, and that to a greater depth, than a man, a boy, and four horses in a stiff, clayey soil; insomuch, that a farmer bred in Norfolk, Suffolk, and other light soiled counties, when he sees in the heavy soiled counties a man, a boy, and four horses, or, perhaps, two men and six horses employed at one plough, is apt to exclaim against the practice, and to think it a profusion of strength wastefully bestowed, when in fact the greatest strength thus exerted is but barely sufficient for the labour that is to be performed.

The black boggy soil discovers itself likewise at first sight; and though there are more varieties of this soil from the combustible peat to the four uncultivated marsh, than in any of the former; yet there is hardly any species of this soil that may not be employed to profit by an industrious intelligent farmer.

The peat bog cannot be turned to greater advantage than in furnishing fuel, if fuel is scarce in the neighbourhood where it is found; or, if that is not wanted, burning it to ashes for manure, which is done first by cutting it out of the moss or bog with an eared spade, called in some countries a *flane*, drying it in the sun, and then piling it up in a pyramidal form, covering it with sods, setting it on fire, and letting it smother till the substance of it dissolves into an ash.

This, near Newbery in Berkshire, and I doubt not in many other places, is a manure much in demand. It is sold at a groat a bushel and sometimes more, and this has led several people, possessed of moory

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moory ground, to dry and burn that to an ash; like the true peat, which is a counterfeit of the most pernicious kind, as it disappoints the purchaser, and brings a discredit on the true peat-ash.

Moorish ground may in general be converted to better purpose than burning it; for much of it by means of salt may be improved into sweet meadow pasture, and such of it as lies wet and flat, and inconvenient for draining, may very advantageously be planted with poplar, alder, or willow, as I have already hinted. In fact, if my young farmer has much of this kind of land, it may in general be more profitably improved than in tillage.

Some authors, indeed, recommend draining and marling these boggy soils; but as I have never seen this succeed experimentally, I am cautious of recommending it. Salting I have known succeed upon the fourest bog; but laid on in such quantities, that the whole herbage was first destroyed; and it was not till the third year that the sweet grass began to appear: on the fourth year it produced as fine a sward as the sweetest meadow.

In Staffordshire many instances, I believe, of the like kind might be collected.

The draw-back upon foul salt will now enable my new farmer, if he is so inclined, to try experiments of this kind; but with this caution, that salt of itself is never to be used as a manure, only as a destroyer of baneful weeds, and a stiffener and sweetener of boggy soils; for salt in excess will kill the rankest growing vegetable.

The dry brown caking soil is not unfrequent, and yet has never been classed by any writer that I have consulted as a distinct species. The characteristics of this soil are, that it imbibes rain plentifully, but that in a few days it cakes or crusts over in such a manner, as to prevent the spears of young plants from penetrating.

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trating its surface, and, by that means, retards their growth; that it discharges its moisture too precipitately, and is generally either too wet or too dry. But the most distinguishable characteristic of all is, its turning up dry, mouldy-like, and moistureless, part lumpy and part crumbly, unless after long continued rains. To prevent this, and to mellow the clingyness that generally accompanies the soaking of this soil by excessive wet, drift sand has been unsuccessfully tried, and marle has been found to be the only remedy. It is a distinguishing property of this last body, that when it is immersed in water, it falls immediately into a powder, and is never again to be united; by marling, therefore, this caking soil is rendered more friable, and, by destroying its gumminess it becomes more accessible to the rising spears of young plants. But whether this be the physical cause or not, is not material, the effect is such, and marle has been found to impregnate this kind of soil with wonderful fertility. To marle, dung is an excellent addition, and where it can be procured upon reasonable terms, should never be omitted. I have found that half the quantity of fresh dung will produce a more immediate effect upon this kind of land, than double the quantity of rotten dung, though rotten dung will be more beneficial in the end, and more lasting.

Another soil, well known to the English farmer, is the gravelly; almost every kind of additional earth, that is laid on this soil, tends to fertilize it, sand only excepted. There are many kinds of grain that flourish abundantly on this soil, especially in dripping seasons, more particularly barley, oats, vetches, and buck-wheat. The mud from old ditches, slimey ponds, or flooded rivers, are excellent manures for this soil; so are clays, marles, and loamy earths; but all these should be laid on in large quantities, so as to cover the surface an inch or two deep.

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I am apprized, that some of the most eminent writers upon husbandry, have subdivided these radical soils which I have mentioned, into many generical distinctions: but, as these might be multiplied without end, I have chosen to confine my observations to those only that are obvious at first sight. Clay is discoverable as clay, whether it be red, blue, white, or yellow; and sand as sand, whatever colour it may have assumed from the ingredients with which it is mixed; and so of the rest. That these ingredients are capable of conferring a greater or less degree of fertility, according as they abound with a greater or less quantity of vegetable food, cannot be denied; but all clays of the same colour are not alike fertile, nor are all sands.

A mixture of clay and sand, as found in its natural state, is called loam; and there seems to be a general concurrence among authors, that this natural mixture is the most beneficial soil in which the seeds and setts of all vegetables can be planted; and, probably, for that reason Providence has provided it almost every where in abundance. But, if mere sand and clay are its component parts, how comes it to pass that, in Dr. Home's experiment, already recited, sand artificially combined with clay, should have no good effect?

There is yet another soil which Dr. Home has chemically distinguished, and which, he says, is hardly to be fertilized by any kind of composts. This soil he calls *TILL*, a name not known to our English writers on husbandry; he describes it of a red, grey, or yellowish colour, effervescing with vinegar and oil of vitriol, diluted with water, and having a peculiar irony taste, to the quantity of which body abounding in its composition, he attributes its sterility. As I have never met with such a soil, I shall not presume to add any thing to what the doctor has advanced,
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who says, that lime and marle are its best correctors. It is to be hoped, however, that very little of it is to be met with near the surface of our English lands, and what may be accidentally thrown up by deep ploughing, may, as he concludes, be gradually improved by lime, dung, and air.

On the stoney hills that traverse England, from south west to north east, the soil is of a peculiar kind; it is generally very shallow, but very rich. Its composition seems to be a mixture of clay, sand, and chalk; and the stones, which every where abound near the surface, are a natural concretion of these three substances; they rise in flakes of unequal dimensions, and are applied by the inhabitants to the various purposes of building houses, erecting fences, and mending the highways. The soil which covers them affords the sweetest pasture for sheep; and when inclosed and improved by folding, yields crops of barley, clover, turneps, vetches, and, in some spots, wheat; by which the occupiers, as the rents are low, are greatly enriched. If my new farmer is a renter of this soil, he must likewise be a breeder of sheep. And, by properly adapting the produce of the one, to the enrichment of the other, he may so improve both, as to excite emulation in those who are witnesses of his success.

C H A P. XVII.

Of the proper Business of the Farmer.

THE art of farming, how easy soever it may be thought by those who view it only superficially, is, perhaps, the most difficult to be acquired of any art or calling, to which the industry of man is applied. - It comprehends such a variety of subjects, the

the knowledge of which is absolutely necessary to the notion of a good farmer, that hardly any one man is capable of comprehending the whole, and but few the greatest part. Hence it is, that farmers in general are deficient in the first principles of their art, and are, for that reason, compelled to drudge on in certain beaten tracts, without daring to move either to the right hand or the left, to find out new and better ways.

I do not mean to insinuate, that scholars only can be good farmers; the knowledge that is gleaned from much reading is rather apt to perplex and bewilder the farmer, than to direct his practice, or to improve the main branches of his profession. To acquire the reputation of a good farmer, a man must be possessed of all those requisites that constitute a great character. He must have a large proportion of natural good sense, a penetrating eye, a quick discernment, an inquisitive mind, an early acquaintance with men and things, great industry, unwearied application, and a memory so retentive, as never to forget what reading or experience hath brought within the circle of his observation.

He should, in the first place, be master of the labouring part of husbandry, without which he will be subject to continual imposition. He must know how to handle the plough, the spade, the scythe, the seed-cup, the sickle, the flail, the fan, and the screen; to set up ricks, and to thatch them; to truss straw, dress hay, cut chaff, and feed and manage cattle. He must know how to cart, and portion out his manure in the field; to carry his corn to market, and dispose of it there to the best advantage. He should be master of the mechanical part of his profession, that he may be able to deal with wheel-wrights, plough-wrights, smiths, farriers, collar-makers, &c. He should know how to hedge, ditch, plash, fence,
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lop, and faggot up wood; and, if in all, or any of these, though the lowest and most servile articles of the farmer's profession, he is deficient, he will, in proportion to his ignorance, be assuredly a sufferer.

But the farmer's attention must not be confined to these subordinate offices, though every one of them must pass under his immediate inspection, he must employ his thoughts upon things of greater consequence; he must study the nature of the land he is to bestow his labour upon; of what soils it may consist; how best to be improved; and to what particular uses it is most naturally adapted: for I account forcing of land to purposes, to which, by nature, it is utterly unfit; altogether as fruitless as to bestow a liberal education upon a natural fool: the farmer should be acquainted with the properties of bodies, in order to be able to adapt one to the improvement of the other: and, he should endeavour to learn the constitution of plants of various kinds; their proper seasons for sowing, dressing, growing, and gathering; that he may, by an uninterrupted succession of profitable crops, enrich himself without impoverishing his lands. He should not be ignorant of the culture of hops: should know how to propagate poles, to plant and improve orchard trees, and to make and manage cyder. He should know how to measure and level his grounds; how to flood and drain them occasionally; how to make ponds, and stock them properly with fish. He should have a general knowledge of grasses, foreign and native, their culture, the soil they delight in, and the uses to which they may be applied, in feeding cattle to the greatest advantage. He should have skill in roots, that, if swine are in demand, he may know how to increase his stock at the least expence. He should be a complete judge of cattle of all kinds, that he may not be at a loss to buy in or sell out, as circumstances

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be prepared for rye; and the like quantity for vetches, which may be all sowed, harrowed, and completed before the wheat season commences.

Towards the latter end of September, is the proper season for the occupier of a new farm to begin ploughing for wheat, which he may continue to do in the manner directed for turneps, till the beginning of November, in which time, sixty acres or more may be prepared and sowed upon one earthing, which will be more likely to be over-rank than over-lean, if two bushels of the red Lammas only is sowed upon an acre.

It may not be improper here to remark, that though the land should be plowed dry, it may be necessary to wait for rain before sowing, provided the land turn up hard, dry, or stiff; but if mellow, sow as you plow. The land made choice of at first, both for turneps and wheat, should be the dryest about the farm, no matter what the soil, provided there be depth enough of earth for the process which I have directed; that is, of turning down the swart, and burying it, at least, five inches deep, without going below the staple; a shower a-top, and the rotting of the green swart underneath, with the ordinary rains that fall in the course of the year, will yield moisture enough for the purposes of vegetation, even to the dryest, and naturally poorest fresh broken up earth.

If the winter proves mild, plowing for beans or pease may be diligently pursued, after all the wheat is in the ground; but, if frosts should set in, as is usual about this season, then the accumulation of manure should be the grand object of the new farmer's attention, who, while his men are all properly employed upon the surface, should cast an inquisitive eye into the bosom of his farm, and should carefully examine the under strata to search for marle, chalk,
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or rich earth, because, with compositions of these with dung and other materials, the very best manures for land are prepared.

When these are discovered, no time should be lost in digging, and properly placing such quantities as so large a farm will necessarily one day require, of which too much cannot be too soon exposed to the air to meliorate, as the longer it is exposed, the richer it will grow.

Let not this business, however, interrupt the ploughing and breaking up the ground, when the weather permits; for tho' in a new farm, all sorts of seeds must be sown upon the first earthing, yet being supposed to be all fresh ground, there will be little doubt of a crop, if the season be favourable to sow the seed.

As four ploughs will make great dispatch, much may be done in a little time; and as there is now no other employment for the men and horses, but that of ploughing, trenching, or fetching manure, the proper seasons may be watched for all these operations, and every favourable moment improved; inso-much that in January and February, sixty or seventy acres of beans and pease, upon a supposition that the new farm is taken from an open waste or common, and no stubbing is necessary, may be completely accomplished; and, if the same diligence is continued, *as was supposed* to operate with regard to the former croppings, before the latter end of March, seventy acres of oats may also be completed; which will leave only barley and clover seed to be provided for in the month of April.

The inclosures which I would allot for barley and clover, are those already cropt with turneps and rye, and fed off with sheep and neat cattle. The farmer's business is to plough in the foldings as shallow as possible, and that as soon after the sheep have eaten
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off the turnips, and the cattle, the rye, as his other croppings will permit. This done, let the whole be sowed with barley, about two bushels and an half to the acres as fast as it is ploughed, and let the barley be well harrowed in. In this condition it may lie about eight or ten days, and when the weather permits, add two pounds of clover-seed to every acre, and then roll the whole well in together. This rolling should be performed just after the barley begins to look green, and not before, for rolling sooner may check the tender spears of the barley, and prevent their rising, but after they are fairly above ground; if the clover were to be lightly harrowed in before rolling, the springing up of the seeds would be the more sure.

It will not follow, that because the clover-seed is here directed to be sown after the barley is come up, that clover seed should always be retarded till that time. In some seasons, and in some circumstances, it may be necessary to prevent its too great luxuriance before the barley has acquired the ascendancy; In other seasons, and in other circumstances, it may be more adviseable to sow it early, to escape the fly. I do not pretend to lay down one general rule that will suit all cases, and all seasons; much may be said upon paper, but more must be left to the farmer's own discretion.

C H A P. XIX.

Of Earths proper for Manure.

HAVING now completely provided for a first crop, by placing all the seeds in the ground; while these are proceeding to maturity, let us digress a little in order to direct the young farmer's attention to the improvement of his land for future crops,

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as those must not be expected to rise like the first, without some additional dressing. I have already cursorily mentioned some of those earths that are proper for this purpose, and shall now enter more precisely into their description; and first of marle.

This is a fossil body unctuous and slippery; it soon relents after rain, flakes like lime, and at last dissolves into the finest powder. If a lump of marle be exposed to the air it will soon break into small parts, and there will be a hoary congelation on that part of it exposed to the sun. If when it is dry, it is powdered and a handful thrown into a clear coal fire, it will crackle like salt. If a piece of dried marle be put in a glass, and as much water as will cover it, gently poured in, it will gradually dissolve into a liquid soap with an ebullition. It will also effervesce as has already been remarked.

There is a sort of marle, called pigeon's marle, of a fine light brown colour, with blue veins; and another sort called lead-male, dark and blackish, heavier than the former, and not veined; but both, when first dug out of the pit, cut like soap.

There are also blue, white, red, and yellow marles, but the colour makes little or no difference, provided they are possessed of the properties already described.

Marle is sometimes discovered near the surface, by carefully observing the ditches and hedges; but the best way of searching for it is by boring, especially where a kind of hoar or mouldiness is seen on the banks of the hedges. It frequently lies a great depth under a bed of clay.

It is an excellent manure for sandy, dry, gravelly, or hungry caking land; and is good for all lands; particularly clay. When laid upon grass land, it has a wonderful effect, and will in a year or two bring up white clover in such quantities as if the land had been sown with the seed of that vegetable.

Lands

Lands properly marled will last twelve or fourteen years; about thirty loads to an acre is a proper quantity. It should be laid on in September, October, and November, that the rain and frosts may have their full effect in breaking and dissolving the largest lumps; and care should be taken to spread it as equally as possible on every part, before the plough is applied to break up the ground.

Dr. Home divides it into two different kinds, clay-marle, and stone-marle; and adds a third, which he calls shell-marle, totally different from the two former, being an animal substance of equal virtue, however, with the fossil. One quality the doctor mentions, which is of great importance, and that is, its power of attracting and dissolving acids, without which no substance can be called marle: he found by experiment, that stone-marle destroy'd about a third more of the acid than clay-marle. Another quality is, that though it resembles clay, it cannot be converted into brick; and he even doubts, if it can be converted into glass. He supposes it a mixture of lime and clay, but so tempered by nature, that no art can equal the composition.

“There is, says he, a body very similar in appearance, but very different in effects, often found in the same bed with the best marle. It agrees with marle in dissolving in water, but it differs remarkably from it in raising no effervescence with acids. It turns syrup of violets red; whereas marle, like other absorbent earths, gives it a green colour. It is of a darkish lead-colour.”

From these distinguishing properties, the cautious farmer will carefully avoid being seduced by its promising appearance. I myself was once ensnared by it.

In digging a well on the side of a clay hill, the workmen met with a stratum of this lead-coloured earth;

earth, ten feet deep, and threw up a great quantity of it. As it was near a public road, many farmers cast a longing eye towards it; they felt it, and as it was unctuous and slippey, they concluded it was marle, and I was offered a crown a load for it. I did not then know the distinguishing characteristics; and I concluded, that if it was worth a crown a load to them to carry away, it certainly must be worth more to me to use upon the spot. Accordingly, I caused it to be spread plentifully upon an upland meadow, which had received no amendment for many years. It was about Michaelmas when it was laid on, and it had all the advantages of air, rains, and frost to mellow it; and, indeed, it was so mellowed, that instead of falling to a powder, it ran into a soft oily consistence not unlike new churned butter. In the spring, when I expected the good effects of it, to my great surprize the grass wore a dead appearance; here and there a green blade amongst the faded swart, but that, like the rest, soon drooped, and in short, the most astonishing sterility ensued. None but my own servants were made privy to the disappointment; for I did not chuse to be laught at by my neighbours. I was not without hopes, however, of its recovery; but though it is now more than ten years since this accident happened, the land on which this poisonous substance was laid, has not yet recovered its wonted fertility.

The Doctor attributes its poisonous effects to the mixture of salt of steel in its composition, and I believe very justly; for above this stratum of lead-coloured earth, large quantities of iron ore were discovered, which on digging clay in other parts of the hill were found here and there dispersed in round clumps, about two or three cart loads in a clump, as if a round hole had been dug, and the iron stone had been shot into it. Other metallic and fossil substances

were

were found also in digging this well; and, indeed, when at the depth of seventy feet, the water was reached, it was so strongly impregnated with sulphur, that it could not be commonly used. I was not, however, aware of the pernicious effects of the blue clay, till I had read Dr. Home's book, where the description of it so exactly corresponds both in colour and effects, that I think the Doctor's accuracy in describing it, and his candour in cautioning the husbandman against its poison, cannot be too much applauded.

Secondly, Another earth that has been used by way of manure, is known in Cornwall by the name of soapy-rock; but as this earth has of late years been applied to quite another purpose, and has risen in its value too much to be used as a manure, and indeed is too confined in its production to be of general use in promoting vegetation, I shall not trespass on my reader's time with the description; only it may be just necessary to add, that the soapy-rock is now chiefly used, as a principal ingredient in making Porcelane ware, for which purpose it sells for 15 or 16l. a ton.

Thirdly, Virgin Earth. This earth needs no description; it is taken from banks long exposed to the action of the sun, or from rich spots on pastured commons, and it is observable, that for one year will fertilize poor land, but is not to be depended on, nor used where other manure can be had at a moderate rate. Indeed where a considerable quantity of it can be had at no great expence of carriage, it may be made the foundation of a very rich compost; for according to Platt's *Enigmatical Description*, "if this Saturn, as he calls it, were to be placed so as to receive the *Aqua Caelestis*, or rain water, enriched by the fullage of the yard, and frequently stirred, it would in a short time con-

tract

“tract a most fertilizing quality;” but, perhaps, more proper for the garden than the field, as the expence of labour in the latter case might exceed the profit of the produce.

All projects I would cautiously guard the new farmer from attempting; yet manure is so absolutely necessary to improve his ground, that I shall omit nothing on this head that furnishes a reasonable hope of success.

Fourthly, Of Chalk. I have already said so much of this substance for a dressing, that little need be added; but I find the opinions of authors, ancient and modern, so various concerning the essential properties of it, and the principle by which it fertilizes, that I cannot help offering some farther observations upon it, which seem to have escaped the notice of those who have examined it with the greatest nicety.

Chalk, as I have observed, has one property almost peculiar to itself; namely, that it cools hot land, and warms cold; it is, therefore, equally proper for sandy and gravelly soils, and for clayey, sour, and wet soils. It is this seemingly contradictory quality, that has led authors who have observed its good effects upon cold land, to forbid the use of it upon hot land, and the contrary; yet by my own experience, I can safely venture to recommend the use of it on both.

Nothing will fasten the swart of poachy meadows more effectually, than the rubbish of a lime kiln, or the small crumbly pieces that break from the chalk in digging; nor will any thing meliorate stiff clay, and make it work pleasant and easy, sooner than fat soft chalk laid upon it at a proper season, and exposed in the winter to the action of the various changes, with which the atmosphere in the months of November, December, and January is diversified. On the contrary, no enrichment that can be laid on sandy,

sandy, or gravelly soils will preserve them in a more exact temperature than chalk, properly applied. Those lands which were accustomed *to burn*, as the farmers phrase is; I have seen cured of that quality by a liberal application of chalk, and where the soil has been so sandy and loose, as to retain little or no moisture, I have seen it increased in its tenacity by the same means.

Some have affirmed that chalk impoverishes the land, and that without dung, it will, in a crop or two, render lands barren; the contrary of which is the truth. That dung will add to the vigour of lands manured with chalk, cannot be denied; but that chalk impoverishes any kind of land, is a vulgar error. In light lands it is, indeed, apt to sink in a few years below the immediate operation of the plough; and then, indeed, its virtues become imperceptible; but while it remains, as a mixture in the earth that is pulverized, it never loses its fertilizing property; it therefore continues longer to operate in strong land than in light, because it does not so soon subside in the one as in the other.

Lime, which is no other than chalk exhausted of its moisture by the action of the fire, and to speak intelligibly to every capacity, like a man after a profuse sweat, eager to drink up whatever comes within his reach, attracts the dews and moisture of the air with so much precipitation, that it will even flake itself; and it is not till after it has, in part, regained its former humidity, that its vegetative powers are exerted upon grain, it having no sensible effect, if Dr. Home's word may be taken, the first year, except in killing vermine; an assertion, however, which experience does not confirm; for in Sussex, where lime is most used, they bring chalk twelve or fourteen miles through very bad roads, and burn it into lime

to dress for wheat. If it had no effect the first year, it would, therefore, totally disappoint them of a crop.

This however seems to confirm what I have advanced, that by its powerfully attracting moisture from air and earth, it first enriches its own substance, and then communicates its vegetating virtue to the grain.

That lime, therefore, should exhaust the food of plants; or to speak more properly, that it should collect it suddenly, and expend it plentifully, is neither inconsistent with reason, nor the uniform course of things. In the order of nature, whatever we see hastily rise, excites our admiration for a very short period, and then as speedily decays.

“ There is, says Dr. Home, a very great attraction between quick lime, and all oily bodies. It attracts the oils powerfully from the air and earth, dissolves them, and renders them miscible with water; it must, therefore, soon exhaust the soil of all its oleaginous particles. Farmer’s have by experience, discovered it to be a great impoverisher of lands, but they did not know how it acted.”

It is most certain, that lime can never repay the charges of the first cost, carriage, and burning, in countries where it lies at a great distance, were these different articles of expence to be paid for in ready money; but the farmer having his team at leisure, his men unemployed, and his fuel upon the spot, calculates only the price of the chalk, and what he pays the burner and for turn-pikes, and all the rest is rated in the gross among the annual expences of the farm; and as it helps his crop of wheat, he pleases himself with his imaginary gains; whereas, were he to calculate nicely the several articles above recited; and compare the large and certain expence, with the small contingent profit, he would never lime another acre.

In

In three years, lime will begger rich land, more than chalk will do in a century; and, as for poor land, it may gather some virtue from it at first, and communicate that virtue to the succeeding crop; but the land, poor before, will become poorer, by the means used for its enrichment, as I myself have experienced.

I will, therefore, lay it down as a certain and uncontravertible maxim, that *chalk* fresh from the pit, laid on and managed as before directed, in the proper season, will enrich every sort of earth it is laid upon; and that lime, on the contrary, laid on at whatever time, or managed in whatever manner, will, after the first and second year, impoverish every soil it mixes with.

Fifthly, Fuller's Earth. This earth is so well known in Britain, that any description of it would be superfluous. It is, like marle, a fossil body, abounding with nitre and vegetable salts; but the great demand for it in the woollen manufactory, renders the use of it in agriculture, altogether impracticable. It were therefore impertinent to add any farther account of it, except that the exportation of it, like wool, is prohibited, and for the same reason.

Sixthly, Loam. This earth is not so distinguishable from clay, as not to be sometimes mistaken for it; Chambers says, it is clay with a mixture of sand, but there are certainly other ingredients in its composition, as clay and sand, however artificially combined, will not produce the same effects. It is frequently laid upon orchards, and most gardeners chuse to cover their hot-beds for raising melons with it, and for filling up the holes in which they plant fruit-trees of every kind. Some farmers use it to stiffen their light lands, and where marl cannot be had, they substitute loam in the room of it. It is certainly a valu-

valuable dressing for chalky or gravelly soils; but should be laid in two or three inches thick, to have its full effect.

Seventhly, Shelly Earth. This has been mistaken by some for marle, though essentially differing from it, as marle is a fossil, this an animal substance: Where this however is found, it is almost universally used for a manure; and even sea shells of every kind, gathered loose upon the beach, have been used to great advantage on cold wet land. In Ireland they improve their bogs with this manure, which is found to be very lasting.

These are the principal earths that are simply, and seperately used as manures for improving the vegetable properties of land; but there are besides, many artificial composts, which I shall endeavour to bring together for the common benefit, as the materials of some one or other of them may be found in every place, though, perhaps, the most powerful may be confined to particular spots.

C H A P. XX.

Of Composts, and vegetable Manures.

THE dung of all animals whatever is found to improve the vegetable properties of land universally. These, indeed, are not all equally impregnated; and therefore it has been found necessary to moderate the vigour of some, and to increase the languor of others, and hence the benefit of composts.

The immoderate heat of pidgeons dung is best allayed with the temperate coolness of virgin earth. A mixture however of vegetable substances seems necessary to produce such a fermentation, or intestine motion, as to quicken putrefaction. Hence a mixture of straw, with a proper quantity of animal dung
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and urine, will ferment powerfully; and the straw, which otherwise would not corrupt, will in a very little time contract such a heat, as to dissolve and disunite its parts, and render it putrescible.

Human ordure, the blood of all animals, and the flesh of fish, are powerful putrescents and want correctors; these will enrich treble the quantity of their own substance. When mixt with straw, green fern, earth; clay, or any other additional putrescible or miscible body, they very soon convert them into a similar substance, and make an excellent compost for manuring land, when all rotted together.

Every part of the animal substance, as it continually tends to putrefaction, has been found a stimulus to vegetation; even the horns and hoofs of animals, horn-shavings, the hair and wool, the parings of the skin, and the very bones, are all excellent ingredients for warming and fertilizing cold land: On this principle, woollen rags are strongly recommended, but I think they are in general become too dear. Markham indeed says that a sackful will manure a whole acre.

The compositions, in order to intcrease the quantity, and temper the quality of manures, are many in number, and some of them recommended by old and new writers, are trifling enough.

As I am now treating only of such composts, as may be had in large quantities for the farmer's use, I shall not enter minutely into such compositions as gardeners have recommended, but such as I think may be procured in abundance, some suiting one place, some another.

Among these, the filth of fishing towns, mixt with pasture earth in equal quantities, makes an excellent compost. It should be placed in some hollow shade, and well turned and mixt before it is used.

Unflaked

Unslaked lime, mixt with coal cinders laid in heaps, make an excellent compost for rank wet soils. By the lime slaking, the cinders are consumed to an ash, otherwise little good is to be expected from them.

Common pasture earth, mixt with the foul salt and brine from the Greenland fishing ships, in which the oil, blood, and blubber of the fish form a considerable part, make a compost inferior perhaps to none; in this mixture, however, there should be at least three parts earth, and one part of the briney substance, and it should be well mixt, and frequently turned, and by all means preserved from the action of the sun till it is laid upon the land, and then it should be instantly plowed in.

The ingenious author of the Farmer's Letters, recommends a compost of clay, mixt with dung, in this manner: A layer of clay first, and then a layer of dung; and so on, till you have completed the quantity you have occasion for. The measure he prescribes, is fifty loads of clay to twenty of dung; and this should be laid in a shady place, well mixt and tempered, before it is carryed upon the land. This I have tried upon a gravelly soil, and found it answer.

Sheep's dung, with a composition of an unctuous sand; such as is found in many parts of several countries, particularly Surry, Suffex, Norfolk, Suffolk, Oxfordshire, Worcestershire, &c. and moisten'd with the sullage from a cow lair, is a most excellent composition for stiff stubborn land.

The rubbish of old houses, mixt with mud and virgin earth, make a very good compost.

Cowhouse, hogstye, pigeons, or poultry-dung, with a mixture of fresh earth; in short, all putrid bodies mixt with corruptible or earthy substances, will make a compost that may be relied upon for producing good crops. The farmer cannot add too many ingredients to his compost-hill, provided they are corrupted,

or capable of corruption by their commixture with other putrified, or putrifying substances; but one thing I would particularly recommend rather to use them in their putrified state, than when they are only putrifying; or, in other words, let the farmer rather use his dung rotten, than when it is fresh. For let him be assured of this, that one load of rotten dung will have the effect of two, though unexperienced writers, by reasoning from analogy, without the advantage of practice, advise the contrary.

I am aware that some adventurers have recommended the careful preservation of the sullage from the dung-yard, with the addition of all the urinary or briney mixtures, that can be collected in the family; and for that purpose have contrived proper reservoirs, and by means of a kind of water-cask, with leathern pipes affixed, furnished with rose heads, like those of ordinary watering pots, instead of cocks, and laid upon a light broad-wheel'd carriage, have watered their lands with this mixture, instead of dunging it; and have, as it has been asserted, reaped very profitable crops from this management, which I do not question if properly timed; yet I much doubt, whether such a watering bestowed upon wheat previous to, or at the time of sowing, and no addition from dung given to it, would be sufficient to insure a crop. I should myself be very unwilling to rely upon it; but I do believe, that from such a watering, performed in a dry season soon after sowing, and again repeated in a dry season while the wheat or other grain is in blade, a good effect may be expected. At all events, this sullage, as I have elsewhere said, should be saved; for where there is a convenience of frequently conveying it upon land at a small expence, nothing can more effectually enrich it.

Every vegetable, when reduced to a state of putrefaction, becomes an additional aid to the vegeta-
tion

Of Composts, and vegetable Manures.

tion of other plants. It is observable, however, that those vegetables that have perfected their seeds, are more properly converted by fire to the purposes of vegetation, than by putrefaction. The ashes of fern, nettles, docks, thistles, and all weeds of what kind soever, that have perfected their seeds, afford an excellent manure; and may be sown like foot upon grass-land, or upon corn in the blade to great advantage. The mowings of grass-walks, cast by hand-fuls into the furrows of a plowing-field, and the mold turned upon it, will produce amazing crops of barley, or oats; but this, as it cannot be had in any considerable quantities, to coincide with the precise time of using it, which must be in the last ploughing for feeding, and must be used green, can never be very general; and the writer only tried it in a few furrows by way of experiment. The mowings, however, may be applied to a very beneficial purpose in the garden; by placing it in trenches dug on purpose, about ten inches deep, and spreading it regularly in those trenches to the thickness of three inches, then filling in the mold to the height of six inches from the bottom of the trench. In this manner it may remain till your potatoes are ready to plant, in the doing of which, observe to place them about a foot apart in these trenches, and then cover them with the remainder of the mold. In this manner potatoes of two and three pounds weight have been procured.

Mowings are likewise very good to place in the alleys of asparagus beds before winter, covering them with mold two or three inches deep. They must be used green, and the mold not laid upon them too thick.

Tanner's bark is an excellent manure for cold land, but now chiefly used for hot-beds. Some recommend it, after spending its heat in the hot-bed, for land;

but to this practice I can say nothing, and doubt much of its efficacy.

Kelp, and all sorts of sea weed, are excellent manures. Peat-ash, I have already mentioned. It should be used like soot, or the ashes of other combustibles, but more cautiously; six bushels sown upon an acre of wheat before winter, and the same the latter end of February, or the beginning of March, seem the proper quantity. On turneps the like quantity when sown, and when they are just coming into leaf, will, it is said, preserve them from the fly.

Saw-dust, either of oak or yellow deal, is an excellent manure.

Malt-dust, and willow-tree-earth the same.

The roots of cabbages, the halm of potatoes, the clippings of hedges, all burnt together, and sown upon land, fertilizes exceedingly.

The sweepings of Streets in large towns, if we may credit Millar, exceed all other manure. Soap-boilers ashes, if we may credit Sir Hugh Platt.— This, with sea-weed, lime, chalk, and earth, is certainly a most absurd composition, tho' strongly recommended by this last writer. Whatever composition is added to chalk, robs it of a part of its essential qualities. It should be laid upon land, pure and unmixed, and if dung be thought necessary, it should be separately laid on before or after the chalk has received the influences of a changeable air.

C H A P. XXI.

Of Improvements by Tillage, without Manures.

MR. Tull, the father of the New Husbandry, of whom I shall have frequent occasion to speak in the subsequent parts of this treatise, tho' he does not absolutely exclude dung, or other manure, from
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his system, asserts "that as dung serves only by its fermentative powers to crumble, divide, and dissolve the earth, all this may be done by tillage, tho' perhaps it may require a longer time to effect it." The principle I believe to be just, tho' I am doubtful of its answering in practice, and would not wish the young farmer to rely upon it, except where none of the ingredients are to be procured that I have before recited, except at a price greater than the profits that may be expected to be reaped from them. Pulverizing the earth, to use his own favourite term, is not the only use of dung, tho' the following experiments, I must own, seem to prove it.

I caused a quantity of virgin earth to be rubbed fine enough to pass thro' a sieve, and then divided it into three equal parcels. I mixed with two of these parcels a quantity of dung, equal in weight to one fifth part of their whole substance, one parcel with stable dung from a fresh dunghill, the other taken from the bottom of a rotten hot-bed; the third parcel was left without manure, and the same weight of earth added to it, as of dung to the other two parcels. The weight of the virgin earth in the two pots mixed with dung, was 15 lb. in each; and the proportion of dung was 3 lb. in each; the weight of the virgin earth in the unmixed pot was 18 lb. These three parcels thus composed, were filled into pots of twelve inches diameter, and into each of these pots, I planted five grains from the middle of the same ear of wheat in this quincunx manner: each grain being just two inches apart from every other grain, and I planted them with a gage, each one inch and a half below the surface of the earth. I was very exact in the size of my pots, lest an increase of surface might cause an increase of vegetable food. Having done this, I placed the three pots upon an open level spot in my garden, each one foot from the other, on the 7th day of October, 1769.

I marked their progress thro' the winter, and found the seeds planted in the virgin earth, more vigorous and more prolific than those in either of the other two; the plants in the earth mixt with the rotten dung, were next in vigour and increase: but those planted in the fresh dung, tho' they appeared the greenest, and rose the highest at first, drooped before the winter was over, sickened in the spring, and before harvest dwindled to little or nothing. I was prevented from noting the produce of the grain by the ravage of birds that almost wholly thipt the ears; but the increase was as follows: from the five seeds in the virgin earth, 56 stout stalks arose; from those in the earth mixed with rotten dung, 35, and from those in the fresh stable dung, only twenty; some very puny.

I am sensible however, of the insufficiency of this experiment on two accounts; the first, from the want of room in the pots for the roots to spread and collect food for the nourishment of the plants; and the other, from not attending properly to supply them with water.

To obviate these two defects, I have this year varied my experiments, by enclosing the pots in the ground, pressing the earth round them, and then taking them out, leaving their exact impression behind, in which I have filled the same quantity of well-pulverized earth, mixed exactly in the same manner as was last year confined in the pots themselves; by which means the tender fibres of the roots when they have occupied the narrow space contained in the hollow, may now extend themselves on all sides, and collect nourishment. For it may possibly be, that dung by its warmth, and by its fermentative powers, may stimulate the roots, and cause them to extend their fibres to a greater distance, than earth tho' equally fertile, yet more at rest, may be capable of; and this may be one essential property of dung;

dung, and more particularly of fresh dung, without which it may lose a part of its effect.

A third defect in this experiment for the purposes intended, might arise from the choice of virgin earth, which has been observed to contain within itself all the requisites for the production of a single crop. To the increase of this earth, by substituting an additional quantity of it in the room of dung, the extraordinary increase of stalks may probably have been owing; but to remove this objection likewise, I have this year filled the pots with earth, from part of a field fallowed for wheat, which has been cropt for two years before, without any dressing; so that the result of this experiment will to me be a satisfactory decision of two very interesting questions to husbandmen; one, whether dung is of use only as a divider of the soil; the other, whether fresh or rotten dung are the most powerful in promoting vegetation. The public shall in due time be made acquainted with these discoveries, if life be spared to the writer till the proper season.

In pursuing this subject with more attention than I at first intended, and examining what others had done in the same way, I found an extraordinary increase said to be produced by steeping some grains of wheat in a mixture of lime, nitre, and pigeons dung, and planted in a garden by Mr. Everard of Southampton, in the year 1692, I likewise having read the recommendation of a steep in the news-papers, composed only of brine made strong enough to bear an egg, and the grain steeped in it twelve hours, and afterwards covered with lime, I determined to try the effect of both these experiments, and with this view, I caused a quantity of seed to be prepared according to Mr. Everard's direction; a like quantity brined and limed after the other manner; and a third quantity I selected without any preparation at all,

all. I had previously caused a spot of ground about twelve yards square to be well dug and cleaned from weeds, and in this spot I planted the three parcels of seeds in rows just twelve inches apart, and at the distance of six inches one grain from the other. In the first row the unprepared seeds were planted; in the second, those prepared with brine and lime, and in the third row were planted the seeds prepared with the boasted steep; and this order was observed throughout.

During the winter, the whole plantation flourished abundantly; the grain tillered, and the rows thickened without any perceptible difference, and till the stalks began to ear, a finer and more promising crop could not be wished for; but just as the bloom came forth, a blight or blast struck alike the rows planted with the prepared grain, and those that were not. This was succeeded by a heavy rain and strong wind, which lodged and entangled the rows in such a manner, that no distinct calculation could be made of their contents; which, however, to all appearance could not be widely different.

What was most remarkable in this experiment deserves to be related. The grains that were planted, were all sound and well picked, but the wheat from whence they were selected, was by long continued sowing on soils of like nature, infected with the smut. From this infected wheat I chose to make my experiment on two accounts; first, to determine whether sound grain from an infected field, would continue the infection; and secondly, whether steeps of any kind would be an effectual remedy against the infection. The result was, that the sound grains did carry on the infection, and that neither of the steeps in the least prevented it; many ears were in each row smutty, and we saw no reason to conclude that the progress of the infection, was in the least retarded by either of the steeps. From hence I have reason to
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conclude, that grain from an infected field, though ever so carefully picked, cleaned, and prepared, is utterly unfit for food; and that notwithstanding what has been asserted, as well by foreign writers, as by those of our own country on this article, my opinion is, that nothing will cure it; and therefore, I would particularly caution my brother farmers against infected seed, for tho' I am certain the smutty grains do not vegetate, yet there is a contagion lodged some where, that will certainly shew itself in the succeeding crop.

Till convinced by my own experience, I discredited the notion of change of seed, and could not be persuaded that sound seed would ever degenerate, if sown upon land in full heart. I supposed that poverty alone was the cause. As poor living will make a beggar lousy, so I concluded poor land would make grain smutty; but this method of reasoning, I have found to my cost, to be fallacious.—To return:

A method of improving land without manure, is mentioned by Dr. Home, of which, he says, daily experience confirms the powerful effects in Scotland, tho' I question much, whether it will ever be put in practice in this country. It is founded upon the custom in Scotland, where inclosures formerly were few, of running a turf or sod-wall round a field in the summer for the purpose of folding their sheep, and thereby improving their land.

To do this, men, women, and children, all who have any sheep belonging to the flock, assist; and it is surprising to see how soon a wall of this kind will be raised. This wall, composed of *sods* or turfs, (cut a common spade deep, about a foot and a half long, and one broad,) is exposed to the action of the air, the whole summer and part of the winter following, and, when the rest of the field is ploughed up, is thrown down, chopt to pieces, and spread again upon

on the space of ground from whence the turf was taken. This space, the Doctor says, is rendered prodigiously fertile, so that it is easily distinguishable, by the quantity and deep green colour of the grain, from the internal parts of the fold which have been well manured by the urine and dung of the sheep; and, he adds, "that it has been remarked by farmers, "that it lasts three or four years longer fruitful than "any other part of the sheep-fold."

On my mentioning this singular circumstance to a young man, a farmer's son from Scotland, he said, the Doctor must have been partially informed. It is indeed true, he said, that the part on which the wall is built, will be very discernable, as long as the Doctor has asserted; but the parts from whence the *sods* are taken, and again returned, after being broken, wear no such appearance of fertility, but the contrary, and always produce the worst corn. He therefore attributed the extraordinary fertility of the wall part, and I think justly, to the additional depth of the soil, being a mixture of the finest of the mold detached from the turfs, when the wall is thrown down, added to the fresh earth in the foundation. It is therefore with no good reason that the Doctor recommends the practice of digging and raising fodd-walls, which, he says, will not cost more than thirty shillings an acre, as an excellent method of improving land. This shews how unfit chemists are to direct in the art of farming.

C H A P. XXII.

Of the Method of successively cropping arable Lands.

THERE is no part of husbandry, in which farmers differ so much as in the method of cropping their lands. Tho' I mean only to speak here of the common grain, such as wheat, barley, oats, rye, pease,

pease, beans, vetches, clover, saint-foin, and turneps, (reserving the later improvements to a distinct chapter,) yet, I may venture to affirm that the changes upon so many bells are not more various than the methods devised among husbandmen, (collectively speaking) to vary the successions of those vegetables. To reduce all these to one common rule, I know is impossible. The circumstances of soil, situation, convenience, and seasons, will always require an occasional variation; and therefore, I shall only offer some general hints for particular sorts of land, which may be departed from; when others appear more eligible.

Upon strong stiff clayey soils, when a winter and summer fallow becomes necessary, I would advise ploughing in autumn, or early in the winter, and, when it can be done, chalking; this will naturally induce a respite during the winter frosts to mellow the chalk. Where chalk cannot be procured, marling may be substituted in its room; but where neither is to be had, than ploughing should be repeated as often as the land will admit of it. At all events, plough a second time early in the spring; and, as business will permit and the weeds begin to appear, keep stirring till the proper time for dressing; always remembering to do it in dry weather, in order to get your fallow fine. When that is accomplished, take the first opportunity to give it a good dressing, and as soon as the weeds, by means of the dressing, begin to appear, which they will do in full crops, plough again, and then a last ploughing about the middle of October, will root up and destroy all that remain, and then sow with wheat. Farmers in general are very apt to think that they lose the benefit of dung, if they lay it on before the last ploughing, but that is a vulgar error, dung cannot be too much mixed with the earth before sowing.

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Career and in favourable seasons, by this management, will be in excellent order, and two bushels of good seed sown, or sown as you like, will be sufficient for the production of a plentiful crop. Be assured of this, the more seed will not yield you more corn: but that if two bushels to an acre do not make you a crop, three bushels will not.

Your corn being reaped, prepare your land for a crop of beans, which I would advise to be planted early in the spring. In the winter you will have an opportunity of mellowing your stiff land by frost, and if you have a trenching plough, throw it up in ridges for the benefit of the westerly or north-easterly winds: you will find the advantage of this practice in your succeeding crops.

At the proper season plough, and plant your beans in rows about twelve inches apart, and distant from each other about six inches, you will then have full room to hoe when the weather is dry; and when the weeds begin to grow again, if you hoe a second time in the summer, there is no doubt but the increase will repay the labour doubly; if not, your land will be the better prepared for a future crop.

Next to your beans, prepare for barley and clover, and in so doing spare no labour in winter ploughing, and be sure not to be too late in sowing your barley in the spring. After harrowing in your barley, and when it is just come in blade, sow your clover, and over it lime, foot, peat-ash, malt-dust, or some such light manure, which, by harrowing will bring up your seeds, destroy vermine, and kill the weeds to a very great degree. Be not afraid of hurting your barley by harrowing, you will by that operation, slightly performed, increase your crop.

After your barley is reaped, your young clover will afford excellent feed for ewes with lamb, but must

must not be eaten too bare. And the succeeding year your clover will yield you two rich crops; be sure however, to let a-part a small patch for seed for your self, and that of the first growth, when it will have time to ripen, and being cut down and gathered dry, it may be threshed out as soon as you have hands to spare; a quart of seed thus ripened, cured, and threshed, will sow an acre.

If the autumn proves dry, and your second crop of clover is well got in, you may feed off the latter-math, and then prepare the fifth year, for oats by a winter fallow, when the roots of the clover fermenting, will mellow and enrich your ground wonderfully.

In winter-fallowing your clover-lays for oats, you should particularly attend to the ploughing that it be deep, the furrows broad, the land laid flat, and the swart well covered; for which purpose, contrary to every other fallow, the furrows should be harrowed smooth. This will quicken the fermentation, and mellow the ground by rotting the roots; and, after shallow ploughing early in the spring, if two bushels and a half of oats are sowed, a great crop in a good year may reasonably be expected. Oats sowed in this manner will be early ripe, and as soon as mowed and carried, if you plough deep, so as to reach the rotten roots of the clover swart, and sow with winter vetches, such a crop of oats and vetches will rise together, the first supporting the other, that if the winter proves mild, will well reward the husbandman for his loss of food for his cattle on the oat-ash. Indeed the oat-ash, during harvest, may be fed off by great cattle, after which shattered oats enough will remain for the purpose here spoken of. And if in May, these oats and vetches are fed or flitted off, and a good dressing laid on, you may prepare again for wheat, and renew your crops in succession as before. But if it should be thought more eligible to suffer oats and vetches to ripen;

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as soon as they are mowed in July, if they can be conveniently removed, and the plough set to work immediately, a crop of turneps may perhaps be procured, which being folded off, and the land summer-fallowed, and a half dressing laid on, will be an excellent preparation for a renewal of the old course, by a repetition of the same crops as before directed.

In the method here prescribed, your land will never be exhausted, but each crop will be a preparation for the succeeding one, and with good ploughing, and moderate dressing, land thus managed, instead of being impoverished at the end of any given number of years, will be enriched.

The management of light land must be different. After fallowing, as has already been said, you must well dress with such manure as best suits, and you must endeavour to get your fallow ready for an early crop of turneps. After your turneps have been fed off, you must plough and prepare for pease or summer-vetches; the latter I would prefer, because by sitting or feeding them off, your land is enriched, or by letting them grow, the weeds will be more effectually destroyed, for nothing kills weeds like a thick crop of summer-vetches. As they are quick growers, they soon cover the ground, and exclude the free circulation of the air, without which no vegetable will thrive. And by their being early cleared away, there is more time to prepare the land for wheat; this must be done by ploughing thrice. After the second ploughing, use the roller; and before the third sow your seed upon the level, by which, upon light land, your plants will be more firmly rooted in the ground. Two bushels and a half upon an acre, may be necessary upon a light soil, because the plants are not so apt to tiller or shoot forth stalks upon light land, as upon strong.

After

After wheat, what may be called a winter fallow will prepare the ground for a crop of barley and clover; but it must be recollected, that a light dressing, as is before directed, will be absolutely necessary to secure a crop. After the clover of the second year, you may feed sheep till after Candlemas, and then plow for a crop of oats. The seventh year, it will perhaps be necessary to fallow again, and then you may proceed as before.

On your chalky, stoney, or gravelly land, a still different culture may be the best husbandry. After a fallow, I know no better method than to procure turneps, for that is a proper preparation for whatever crop it may be thought most profitable to follow. And folding them with sheep is an excellent amendment. On these soils, nothing succeeds so well as barley and saint-foin! Saint-foin is the most profitable of all the perennial grasses, and when it likes the soil, it will last a number of years; but care must be taken not to feed it with sheep the first year, nor late in the winter in any succeeding year, for at that season they are apt to bite too close, and to nibble off the crown of the root, which then perishes and never sprouts again. Saint-foin is a great fattener of cattle, and where markets are at a great distance, or where, being near no great towns, there may be little or no demand for hay, no grass that grows fattens so fast for the butcher, nor will any hay keep horses in better heart. It is a more profitable grass than clover, because clover lasts but one year after the first, whereas saint-foin will last fifteen or twenty years without any farther care or trouble, except now and then refreshing the land with foot or ashes. When saint-foin is to be broken up, then fold it off with sheep the preceding summer, and nothing makes a better preparation for a wheat crop, which may be succeeded by
oats,

oats, and then by French wheat, after which a fallow with turneps, and then when fed off sow barley and faint-foin again.

There is a fourth kind of land, whose management must be varied too; and that is the shallow moulded ruddley land, now inclosing and breaking up on the Broadway hills in Gloucestershire; Worcestershire, &c. It has been usual in the management of those lands, to pare off the swart and to burn it, in order to procure a crop; but this exhausts the soil immoderately. I am persuaded that the method which I have directed of paring and turning down the swart, and covering it with the remaining mold, would be preferable to that now in use in those counties; and I am of opinion likewise, that sowing of turneps, after breaking up, would succeed better than sowing of barley and clover, which seems to be the prevailing practice.

After a crop of turneps fed off with sheep, I would then advise barley, with white clover, or faint foin; for I am almost certain, from what I have observed in other counties on like land, that red clover will never succeed generally; the white clover would last for years, and would afford a fine pasture for sheep, and when worn out, might again be rendered as before.

If the faint-foin succeeded, it would be a rich improvement; and that there would be the greatest reason to believe it would succeed, appears from some experiments made of it by Sir Digby Legard, in lands of a similar nature, and published in Doffie's *Memoirs of Agriculture*, by permission of the Honourable Society for the Improvement of Arts. But forcing land to bear corn which by nature was never intended for arable, will, I am afraid, never quit the cost.

In worn-out pastures where moss abounds, it may be a profitable process, which the Rev Mr. Comber, the younger, has prescribed, of paring of the swart, burning it, and ploughing in the ashes; it may be
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the same in the spongy soils of Lincolnshire; but in soils where the swart is sweet, and the mold shallow, that practice must, I think, be hurtful. The reader may observe, that in these processes of improvement, I have recommended nothing to the common farmer, out of the common farmer's way; nor do I recommend any thing to his practice, but what he was accustomed to practise before; all I pretend to is, only to direct the succession of his crops on the true principles of vegetation, by the observation of which, instead of impoverishing his land by cropping it, he will every year enrich it.

C H A P. XXIII.

Of the improvement of Marsh or Moorish-Land.

PERHAPS there is no land that the farmer occupies, that may be turned to greater profit than marsh-land, if judiciously managed; and therefore I shall be the more particular in my directions about the improvement of it. It is not, however, all marsh or moorish-land that is proper for the uses that I am going to recommend; but such marsh-land as is proper, may be turned to exceeding great profit. Much of that land in low meadows that is apt to be over-run with what is commonly called yarrow, and all that kind of black moorish soil that abounds with moisture, without producing peat, or any fossil substance, is the soil I mean, and is very proper for the purposes that I am now about to speak of. In soils of this description, the white willow and the common poplar, several kinds of fallows, and other quick-growing trees and shrubs, may be planted to great advantage. I have already mentioned these aquatics, but shall now enlarge upon their management and growth.

The first intimation I received of the willow proper for plantations on these soils, was from Mr. Sadler, in a paper published in the Gentleman's Magazine, in 1750, and I have since seen many trees of it of a size large enough for the masts of a first rate man of war. Their size, straightness, and quick growth excited my curiosity, and upon enquiry, I was referred for a fuller account of them to a little treatise written by Mr. North of Lambeth, who has, with great modesty, shewn the profit that may be reasonably expected from the propagation of them.

His method does not confine the planter to any particular kind of soil, but as every one knows that willows flourish best on the borders of brooks, near ditches of standing water, and in marshy soils, there cannot be the least doubt but that little hills thrown up at six feet distance from each other in wet marshy or moorish land, and willows planted upon them, will liberally repay the planter's cost. These hills should be about six feet diameter, and should be raised in the manner when the ground is the driest, about two feet above the level of the common swart. In shaping them, the ground being first marked out, a stake should be erected perpendicularly in the centre, and the workman by means of a cord fastened loosely to the stake, and tied to a cutting knife at a proper distance, will mark out the hills on an acre in a very short space of time. On these hills, setts should be carefully planted, one in the middle, and the rest round the edges, so that each hill will contain seven setts, and each sett will be exactly three feet from every other sett on every hill.

To form these hills, the ground in the intermediate spaces should be dug a spade deep at least, and the swart of that which is dug, should be turned to the swart within the circle marked out for the hill, and the mold that remains to be thrown up, should
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be equally levelled a-top of the hill, so that the top should be nearly of an equal width with the bottom, allowing only a small slope to prevent the mold from washing down. This slope the dexterous workman will readily preserve in forming the hill, which, by that means will be gradually extended at the base in proportion as it is narrowed a-top.

The hills being thus formed, as has been said, in the summer, will be consolidated before the season for planting the setts, and the swart by being gradually rotted, will give a proper warmth to the soil of the hill. The season for planting is from the twenty fifth of December, to the twenty fifth of March; all the writers that I have read, advise early planting, but I shall hereafter give my reasons against that practice, especially in these cold soils.

Shoots of the preceding year are best for planting; one good shoot will make three or four good setts, without making use of the top. Sixteen or eighteen inches is a proper length for a sett, eight or nine inches of which should be carefully planted within the ground, so that none of the bark be injured in the setting; the thick end should be planted in the ground, and one or two eyes only should appear above ground; both top and bottom should be cut horizontally near an eye, the bottom immediately under the eye, the top immediately above it. With a proper knife nothing can be more readily prepared, and with a proper gauge they may be very regularly planed.

Being thus planted, nothing remains to be done till about June, but to fence your plantation securely, and that must be particularly attended to; for if cattle of any kind break in, they will deface and destroy all your labour.

In June, your new plantation must be carefully and cautiously pruned, and all the shoots, except the straightest and strongest clean cut away. This must

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be done with a very keen knife, with as little injury to the bark as possible; and at the same time, the weeds that may have sprung up on the hills should be hoed away, and if necessary, the mold forked up.

These directions observed, your labour on this plantation is at an end; and it will not be long before your profit will commence.

In four, or at most five years, you will from every acre have 3000 poles to cut down, each of them, if they have thriven, will be above eight inches in circumference, which upon an average will sell for 12s. a thousand; and the year following you will have a like number, which being so much larger and longer, will sell for 17l. a thousand; and besides, you will have now annually, a succession of young shoots, or twigs of ready sale to the basket-makers from the stubbs. Add to these, between five and six hundred growing trees, which at the end of five and twenty or thirty years, will be worth at least as many pounds.

One single tree, and that the most thriving, should be left upon each hill for timber; were more to be left, they would spoil each other.

This willow has oblong pointed leaves, of a most flourishing light green. At the bottom of each footstalk, grow two small wings, which almost inclose the young shoots. It will thrive in almost any soil, and will make profitable coppice-wood for hoops, staves, ethers, &c. Where setts of this willow cannot be conveniently purchased, those of the poplar tree may; and there is no difference in the management, and therefore it were needless to repeat what has been said. Indeed the poplar, though a quick grower, is not near so profitable as the willow, because the stubbs do not afford a crop of twigs like the willow.

This, however, is not the only use that marsh or moorish land may be converted to. Could we rely on

On Mr. Roque's plausible Communications to the Society of Arts, timothy-grass would be a valuable improvement of these soils; and indeed, I am apt to believe, that if the seeds of the true American timothy-grass were to be imported here in perfection, what is said of that grass, might, in a great measure, be found upon trial to be true. But it is more than probable, that Roque, having once established the credit of timothy-grass, by some few trials in his grounds, imposed upon his correspondents, and sold the common fox-tail grass in the room of it; otherwise, how can we account for the following certifications, which are all afterwards flatly contradicted by a gentleman of known veracity.

“ 1. That it delights in a wet, or moist soil, has roots that runs like couch-grass, and meet together, and form a coat able to bear cattle on boggy ground.”

“ 2. That it grows quickly; for being sown in September, it appears in December a strong turf, as if of ten years old.”

“ 3. That horses, black cattle, cows, and sheep, are fond of it; that it thrives most in low marshy grounds, and in three weeks from sowing, produces a fine turf, is very luxuriant, grows very high, has a broad blade or leaf, and looks somewhat like wheat, or rye; makes excellent hay if mown in full sap, and vegetates all winter; and even when covered with water.”

“ 4. That it will thrive in any ground that does not want *earth* and *water*; that it takes root at its joints, forms a swart in a few months, yields the most plentiful and sweetest crop, either in hay or pasture, being beyond comparison, preferable to Lucern or Burnet.” (Vide Mus. Rust. I. II. IV.)

From all these testimonies, and many more which might be collected, is it not reasonable to conclude,

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that timothy-grass must be a most valuable improvement of wet moorish land.

Add to all this too, the method Mr. Roque prescribed for cultivating it, which was by digging where the wetness and swampiness of the soil would not admit of ploughing, sowing immediately after the spade, and rolling with a light roller. By which it was reasonable to suppose, that, if once the seed reached the ground, the subsequent rain could never hurt its growth, and the rather, as Roque asserted, that when once rooted, it united so thick, and matted together so strongly, that a waggon might be safely pass'd upon its swart in the boggiest soil.

But what shall we say, when after all these testimonials by anonymous writers, Mr. Lewis of Tracey, near Honiton, in Devonshire, gives this account of it in a letter to James Crocket, Esq; of Luxboro', near Henedford, in Essex: "I bought, says he, of
 " Mr. Roque, 16lb. of timothy-seed last Autumn,
 " and sowed it, as directed by him, in September,
 " two acres in wet ground, one acre in moist ground,
 " all a fine fallow and good ground; very little of
 " it came up at all, and it was so very bad in each
 " sort of land, that I was obliged to plough it up,
 " and sow oats. In short, it is a mere nothing;
 " for we have the same grass growing in our coarse
 " meadows, under the name of fox-tail grass. I
 " have compared it, and find it the same; and so
 " has a gentleman near me, who also sowed four
 " acres of timothy, four pounds per acre, at five
 " shillings a pound, and his came to nothing like
 " mine." (See Mus. Rust. vol. v. p. 136.)

That Roque imposed upon his customers, appears further, from a note of the Editor's, who says, he saw the grasses compared, and that the true timothy was not the fox-tail.

The

The late ingenious, and very worthy Mr. Stillingfleet, in a small, but valuable Tract on English Grasses, speaks of one species that would answer in every respect to the high character given of the timothy; this he supposes to be the *floie fescue*. As this gentleman asserts nothing but what may be relied upon, I shall transcribe his own words.

After having quoted what is said of this grass, in the Amæn. Acad. vol. viii. he adds, “Mr. Dean, a very sensible farmer, at Rushcomb in Berkshire, assured me, that a field always lying under water, of about four acres, occupied by his father when he was a boy, was covered with a kind of grass that maintained five farm-horses in good heart, from April to the end of harvest, without giving them any other kind of food. He, at my desire, brought me some of the grass, and it proved to be the *floie fescue*, with a mixture of the marsh bent.”**** He adds, “and that there is grass in Wiltshire, growing in watery meadows, so valuable, that an acre of it lets from 10 to 12l. as I have been informed by several persons; several circumstances incline me to think it must be the *floie fescue*.”—How much more eligible would it be, to endeavour to improve watery lands in this manner, than to attempt to reduce them into arable lands?

There is, besides, another kind of grass, lately discovered by Dr. Gale, in North America, called black grass, that in some particular situations, promises no inconsiderable advantage to the fen country farmer; for in those spots that are flooded by the tide it is said to thrive astonishingly. The account of it was communicated to the late worthy Mr. Peter Colinson, and by him to the public, in the Gentleman's Magazine; but as I have never seen an instance of it, and am not sure whether any of the seeds
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of it are to be met with in England, I shall but just mention, that it thrives in spots only that are flooded by the sea at high tides, and upon flats in salt-water rivers.

C H A P. XXIV.

Of the Improvement of Heath Ground.

THERE are in England, great quantities of this kind of land, which lie waste and uncultivated; and in Wales, in proportion to its extent, far greater. Bagshot Heath, within 40 miles of the Metropolis, does not contain less than 20,000 acres, all of which might, at an easy expence, if we may credit some writers of eminence, be converted into arable or grass lands; and, instead of feeding only an inconsiderable number of sheep, might be improved to the comfortable subsistence of many hundred families. This Heath, however, being in many places a barren sand, is far less improveable, than a multitude of other wastes of the same kind, the richest of which, I am inclined to believe, notwithstanding all that has been lately asserted in favour of them, will require more than they are worth, to reduce them to a state of cultivation.

The ingenious author of the North Tour, who seems to comprehend the heathy wastes, under the general name of Moors, and describes them as covered with ling and wild grass, is astonished that there should be one acre of such land, so easily improved, lying uncultivated in any part of England. He says, that by paring, burning, spreading the ashes, and ploughing for turneps, the whole expence of improving them may be repaid in one year; and he affirms, that the year following, the crop of oats that might be expected to succeed, will rise from
four

four quarters to fix, without any additional expence, except liming, once ploughing, and sowing with seed in the usual manner. The walling and fencing alone, is all that this celebrated writer places to the account of procuring to the owner a fee simple of seven shillings and sixpence an acre immediately, and when laid down with grass letting for twelve shillings an acre. "Fertile fields loaded with corn, and giving food to numerous herds of cattle, ought, says he, to be the prospect in those tracts, not whins, fern, ling, and other trumpery."

In proof of his opinion, he instances the little garden of the turnpike keeper, in the road from Bowes to Brough, in Yorkshire, which is taken from the waste, and produces "excellent potatoes, good garden beans, and admirable turneps."—But from such little spots highly improved, it is not always safe to found an opinion of whole tracts. It is more reasonable to suppose, that if improvements were so easy upon these immense heaths, as this writer imagines, they would not have been so long neglected. But the certain expence of building houses and barns, and other buildings, notwithstanding the almost incredible cheapness of buildings in that part of the country, and of inclosing and fencing, which is confessedly great, opposed to the uncertain event of improvements upon those wilds, ill watered, and worse reared as they are, deters the land owners from hazarding their fortunes in projects of this kind, which Sir Digby Legard has candidly acknowledged to be much less profitable than the author of the North Tour would make us believe.

I have myself made all the enquiry I could, concerning the supposed profit of the land-owners on the wolds, or, if you please, the extensive commons now inclosing on the Broadway-hills in Gloucestershire, &c. And I have not been able to learn from the
most

most sanguine among the proprietors, who are almost all occupiers, after reckoning the whole charges of tanning and passing the bill in Parliament, surveying, setting out, and dividing, inclosing, fencing, paring, burning, liming, plowing, and sowing, that they expect to be in the least gainers: On the contrary, they have acknowledged that had good land already improved been profered to them at forty years purchase, equally well situated to suit their convenience, they would have been gainers by accepting the latter, and relinquishing the former, though the land was nominally their own. And yet there does not seem to be a single house built in consequence of this vast inclosure, but every one has added his portion to his own farm, or to his own estate, and inclosed it after his own manner.

As I have already given my opinion of those inclosures, and of the method of fencing them, I shall not repeat here, what, perhaps, it may be thought impertinent in me to have mentioned at all; neither should I have mentioned any thing relating to them, had it not been to remind my readers of the old adage, *that what is once well done, is twice done*, and to caution them against fencing in the like manner, if ever they should have the like occasion.

It comes, however, with full propriety within the design of this treatise, to offer my sentiments on the best method of improving those heathy wastes. Those of them that are dry, and from the blackish colour of their soil only, are called moors, and not from their boggy wetness, I am persuaded might be converted into wood lands, and by that improvement, advanced to yield as high a rent, as the ordinary run of arable lands throughout England, those only near great towns excepted.

The black heathy soil, is the very soil that the Scotch Fir delights in, and a thousand acres of that soil, might

might be planted with 650,000 setts at 8 feet distance, for 325l. and might be substantially fenced with a good ditch, and bank, and planted with quick; or surrounded with a stone wall, for 400l. more. No preparation of the soil is necessary. Where this kind of planting is carried on, the ground is marked out; and cut at the proper distance, the mold chopped fine, and a cone or a seedling properly placed, covered and secured; the ranker the heath is about it, the more likely the plant is to thrive; for, as Sir Digby Legard has well observed, nothing is so nourishing to young plants as warmth.

Let us suppose, as conjectural calculations are the mode, that one half of these trees should fail, and the other half flourish; those that flourish, amounting to 325,000, at the end of 30 years, may without exaggeration be rated at half a crown a tree, or 40,625l. for the whole plantation, from which subtracting 725l. original cost, leaves 39,900l. for the land owner, being 1330l. annual rent for the thousand acres.

Add to this, that as the trees begin to flourish, the heath or ling will begin to decay, and before they arrive at perfection, the heather, ling, or whatever name else it is known by, will totally disappear, and a beautiful green verdure arise in its stead.

I would ask any proprietor of these wastes, if at less hazard, he can hope for greater improvement. For my own part, I know of no method, that with an equal degree of probability promises so much advantage. The method of paring, burning, and ploughing for corn and grass is very hazardous. It may do very well for a time, but who can answer for its continuance? I never knew any land so managed, but what in a few years required to be restored to its former unimproved state, in order to recruit the treasures it had been induced to lavish. Nature, like a spendthrift, who cuts down his trees to riot in luxury

ry for a few years, may by artful management be induced to pour forth her stores with profusion, for a time; but when these are exhausted, by what art are they again to be supplied. I doubt much, if the plough and the fold will be able to do it, and paring and burning, are operations that cannot be frequently repeated.

It were needless to add, that in those wild wastes, many spots may be selected for plantations of trees of a more valuable kind; and others for farmers that might well repay the owners, and enrich the occupiers. But against plantations of this kind indiscriminately undertaken by gentlemen unskilled in rustic affairs, with a view to profit, I sincerely enter my protest; and against all such wild schemes, which, however plausible they may be made to appear upon paper, will, I will venture to foretel, miscarry, if ever they should be attempted.

Our forefathers were not such fools as the present generation affect to make them appear; they chose the fruitful vallies for their habitations, and left the barren hills and dreary desarts for their more sagacious successors to display their arts of improvement upon. That those wastes, which they abandoned, may be improved, is admitted; but not by endeavouring to convert them into arable lands.

C H A P. XXV.

Of the Improvement of Wolds.

SIR Digby Legard has written so sensibly upon this subject, and by his situation, and the superior advantages of frequent experiments which he has had opportunities of making upon the spot, is so much more master of the subject than I pretend to be, that it would be presumption in me to attempt an improvement to what he has very judiciously advised.

He

He supposes the uncultivated parts of the wolds in Yorkshire to consist of 144,000 acres, and the greatest inconveniencies to be encountered in reducing such an immense tract to a state of cultivation, to arise, first, from the want of water; secondly, from the scarcity of wood for fuel and fencing; and thirdly, want of shelter.

The first, he thinks, may be overcome by ponds and reservoirs, with the value of the last of which he does not seem to be perfectly acquainted, tho' he admits the force of the remark, that as much rain falls annually on every house, as would serve all the purposes of the people within it. In proof of which the reader is referred to p. 38 of this treatise. This inconvenience, may therefore be removed at a very moderate expence.

As to the second impediment, the scarcity of wood, he observes, that tho' trials have been made without success to supply this defect, yet the miscarriage has been owing not to the poverty or impropriety of the soil, but to the careless manner of planting and fencing, particularly the last. He imagines the plantations, that have been in vain attempted, have been planted too thin, as warmth is essential to growth, and that without shelter, no tree will thrive; he instances in proof of this, that a tree planted on the top of a mountain, tho' supply'd with rich earth from the valley below, would by no art be made to prosper, if wholly exposed and unaccompanied with others. But that trees will thrive on mountains, if planted at proper distances, he himself has had proof; for having about thirty years ago, an inclosure of six acres upon the top of a high hill, he planted the whole space with Scotch fir, ash, and beach, the trees of which, are now (1769,) twenty five feet high at a medium, and valued at 544*l.* 10*s.* the planting of which cost him only 50*l.* This valuation amounts to the annual rent of 3*l.* an acre nearly, a fine encourage-

27,000*l.* a year produced; and an increase of provisions in favour of the community, in proportion to the improvement made by such an industrious set of useful cultivators, that would in time add immensely to the strength and riches of this kingdom.

This experienced cultivator does not recommend to others what he has not practised himself; he has inclosed 300 acres on the top of the wolds, and has laid the greatest part down with various sorts of grasses; *saint-foin*, he says, makes the most general improvement, and succeeds best in the shallowest soil; white clover, *rye-grass*, *rib-grass*, and *burnet* succeed pretty well. Lime he explodes, and I think myself happy in having the concurrence of so excellent a judge; the sheep-fold is the only manure he can depend upon. His inclosures are forty acres each to save fencing; but are double walled at 6*s.* a rod of 21 feet, which reduces it to 5*s.* the common rod nearly. He ploughs three or four times, and sows with grass seeds in April and May. He keeps about 500 sheep, and double folds from May-day to Michaelmas, about 38 acres. His profit he concludes from this management, to be 8 per cent. upon the money laid out, and supposes that an improvement equivalent to this, might be made generally throughout the wolds, though not exactly upon his model.

He is aware that so large a supply of grass and hay, could only be applied to feed cattle; but that if a country were to be peopled, corn must be raised as well as hay. For this purpose farm-houses must be built, and a proper quantity of arable, meadow, and pasture allotted to each.

In this view he parcels out his wolds in lots of 70 acres each, and supposes a lot sufficient for a man, his wife, a plough-boy, and four children, (ten acres to each as has already been observed) the rent 35*l.* a year, and the stock as follows:

Acres.

		Acres.		
40 Sheep	} require	$\left\{ \begin{array}{l} 12 \\ 9 \\ 5 \\ 8 \end{array} \right\}$	} to be kept in	grafs for food.
3 Cows				
2 Oxen				
2 Horses				
In tillage		36		

The course of husbandry he prescribes, is, 1. turneps, 2. barley, 3. clover, 4. wheat: He then proceeds to calculate the supposed produce, divided into four fields, of nine acres each; viz.

Acres		£.	s.	d.
9 Turneps	_____	13	10	0
9 Barley, 3 qrs. per acre, at 16s. per qr.	_____	21	12	0
9 Clover	_____	9	0	0
9 Wheat, 2 qrs. per acre, at 2l. per qr.	_____	36	0	0
Profit on 3 cows	_____	15	0	0
Ten lambs, and the wool of 40 sheep	_____	6	10	0
Hire of the team at times the farmer can spare it	_____	12	10	0
		£. 114	2	0

By this calculation, Sir Digby makes the produce amount to more than three rents; but at the same time, he takes the whole 70 acres into the account, allowing no part for a homestead, neither does he allow for casualties, nor for fallows; and I am afraid, from what I have lately seen in wolds of the like kind, that his crops are generally over-rated; in other calculations too, he allows an acre to every sheep; but in this, he allots only 12 acres to 40 sheep: His other calculations are liable to objections: I doubt much, if eight acres of this wold land, will produce food enough for two horses.

Working

Working horses are supposed to eat four loads each of hay, within the year; it will not be said that eight acres of this land, will produce eight loads of hay, without cultivation, and no allowance is made for cultivating them. My design, however, is not to cavil, but to caution my readers against errors in calculations of this kind; I will allow, that an industrious man with 70 acres of land, well fenced and properly divided, may afford to pay 35*l.* a year rent; but I must take the liberty to doubt if the land owner, who shall undertake to inclose, plant, double fence, build a farm-house, barn, and all other necessary buildings for such a farm, will make 8 per cent of his money; and I found my suspicions upon what Sir Digby himself has told us, and that is, that without the charge of buildings, and with his own superior advantage of occupying the inclosed 300 acres himself, and cultivating them to the highest perfection possible, he only made 8 per cent of the money laid out. This surely makes a very material difference:

That I may not be accused of misrepresentation in a matter of so much consequence, take his own words:

“ I seldom, says he, in a letter to the author of the
“ North Tour, lay down more than 40 acres in a
“ year with grass: I generally give the land three or
“ four ploughings, and sow it in *April* or *May* with
“ grass-seeds, with or without corn; the latter way
“ usually succeeds best. I make my inclosures large,
“ containing 40 acres at least, by which means the
“ fencing is less expensive. To inclose 40 acres
“ with a double fence at 6*s.* per rod, will cost
“ 150*l.* The preparation of the ground will cost
“ 42*l.* The ploughing an acre four times and the
“ seeds requisite, is worth a guinea: The interest of
“ 192*l.* at 4 per cent, is about 7*l.* 14*s.* but the
“ annual advance by the inclosure, I have found to

L

“ be

“ be at least 8s. per acre; consequently the advance
 “ on 40 acres, is 16l. or about eight per cent. inte-
 “ rest on the money laid out.”

To the method, however, which Sir Digby has pointed out of cropping his wolds, I have no objection, and think a better cannot be advised, except it may be thought that saint-foin may be substituted for clover, as Sir Digby has acknowledged clover succeeded best.

C H A P. XXVI.

Of the Sheep Walks belonging to a new Farm.

THE practisers of the old husbandry are unanimous in their commendations of folding, as an admirable dressing for land. In the remote parts of many farms, folding of sheep is the only manure the occupier has to bestow upon his lands; and in proportion to the number folded, he estimates the benefit he is to expect.

As in many parts of England there are immense heaths, in other parts, there are equally extensive downs; both these wastes are favourable to our breed of sheep; and the lands that lie contiguous owe in a great measure their fertility to the enrichment they receive from the manure of those useful animals.

It is a question yet undecided whether the many inclosures that have lately taken place by authority of Parliament, are, or not, a benefit to the community. Certain it is, that they are not all equally so to the proprietors; and, were it not that the poor now place their dependence upon their respective parishes as their inheritance, the injury and injustice they would suffer by these usurpations, would cry for vengeance on their oppressors; but the poor have learnt from the example of their superiors to oppress in their turn,
 and.

and to indulge themselves in idleness and profligacy at the expence of those who are frugal and industrious.

There are, indeed, some industrious poor still remaining among us, and for those worthy people they tear of pity must flow when they are inhumanly deplored of their birth right. What is it to them that a certain stipulated sum is allotted to the parish to which they belong, as an equivalent for the inheritance of which they themselves are deprived. The portion that was their right, in common with their fellow subjects, enabled them to maintain a cow and a few sheep, and with the assistance of these, added to their own industry, they fed and clothed their infant family, till growing up, they could provide for themselves. But being deprived of that support, what can they now do? despair takes place of industry, and they become abandoned, because they look upon themselves as destitute.

The wisdom of our ancestors, is conspicuous in nothing so much as in the distribution of property. In the rude state of Britain, all men were upon an equality, except those who by their valour, their wisdom, or their sanctity, distinguished themselves from the common rank; but in the establishment of regular government that equality was resigned. Some voluntarily undertook the cultivation of the earth, while others applied themselves to the useful arts; those of a bolder and more warlike disposition who despised those servile employments, very naturally became the guardians and protectors of those who performed them, and the task of the holy men was the reformation of manners. As arts prevailed and men began to multiply, commerce succeeded, cities and towns were built, castles erected, and villages and hamlets distributed throughout the whole land. Then it was that the great outlines of our happy constitution were planned; but it was not till many ages after that it was

completed. It was reserved to a foreign conqueror, to give every man who was born in this country, a portion of inheritance, of which he could not be dispossessed but by force or fraud.

William the Conqueror considered the body of the people as naturally subsisting under three denominations, warriors, handicraftsmen, and husbandmen. To the warriors, he gave the chief of the lands under the express condition of being ready at all times to defend them; to the handicraftsmen, as living together in cities and towns, and wholly ignorant of tillage, he annexed certain lands to their respective jurisdictions to be enjoyed in common, more for recreation than for tillage; and to the husbandmen, whom he considered as the cultivators of the lands, he allotted vast tracts to be enjoyed in common under certain restrictions, that no man might have a right to appropriate any part to himself of what that wise Prince designed for the common benefit of the whole. Thus every man who was born in the kingdom, and who was not a menial servant, became of right an inheritor of land; and of this inheritance the cottager cannot legally be deprived, any more than the peer, except by his own consent.

By this wise disposition, every man who was born in England had a solid and substantial interest in his country, to which his claim was as just and indisputable as that of the sovereign who sat upon the throne; and there was not a parish in the kingdom, to which a certain portion of land was not annexed, no part of which could be appropriated even by the Lord Paramount, (who was only a guardian to the people,) to his own use, no not by the consent of all who were interested therein, because those of the present generation could have no right to alienate the rights of posterity.

How

How it has happened that parishes have been induced to part with their commons, and that the laborious poor have been forcibly divested of their unalienable birth-right, it behoves not me to enquire; but in a book, professedly written for the instruction of husbandmen, a matter of this vast importance to husbandry, could not be omitted. That the subject is by no means treated with that precision, which is necessary to establish the poor man's claim, I am aware; it was no part of my design, to enter into so interesting an enquiry, which would require a larger volume than the present to discuss. All that I intended was, to assign the reasons for my opinion, that the present mode of compounding with parishes for the rights of the poor cottager, is arbitrary and unconstitutional.

But to return; it possibly may so happen, that my young farmer may now be in possession of one of those farms that have been appropriated from the waste, and is now the property of some great man. In that case, he has no chance for any other sheep-walk, than that reserved within his own farm.

In a farm of 500 acres of land, less than an hundred and fifty should never be reserved for grass; some of which, it may be presumed, will be low meadow, some up-land pasture, and some brake, heath, or furze. Of low meadow, no part is fit for the pasture of sheep; but of the rest, every part is proper.

It has been estimated by some, that an acre of Downs is but barely sufficient for the maintenance of one sheep; and that this allowance, large as it may seem, will be deficient, without some additional provision in the winter; others again allot two, and some three sheep to an acre. Indeed where a quantity of clover may be presumed to come in aid of the pasture-land in the autumn and some part of the winter, an acre of upland pasture may summer-feed three sheep

sheep ; but over-stocking, tho' it may help the land, will impoverish the farmer. Two sheep therefore to an acre, may form the medium by which the young farmer may safely proceed in buying in his flock.

In the inclosures allotted for sheep, it were happy if an easy communication could be formed, that they might be often changed ; for no creature delights more in change, than sheep ; nor is more impatient of confinement. They love to range leisurely, but if they are hurried, it is twenty to one but it breeds some disease ; there wool naturally keeps them warm, and if they are heated, it inflames their blood, and throws the whole mass into disorder.

In Spain, where the property of sheep was formerly an appendage to the crown, and where they still have shepherds appointed by the King, their sheep walks are immense ; from the plains of Andalusia, to the mountains of Reynosa, the distance is not less than 300 miles, which they traverse twice in the year, by easy journeys, feeding all the way they pass. This continual easy exercise not only keeps them in health, but encreases their flavour, so that their flesh is accounted the most delicious, and their wool the finest in the world.

It is worth remarking, that in the beginning of summer they begin their journey from the south, and travel to the north ; and when winter approaches, they begin from the north, and travel southwards, and thus they are almost continually preserved in an equal temperature.

In their northern pastures, they are allowed a large proportion of salt in the summer, which the shepherd strews occasionally on forty or fifty flat stones, about five paces distant from each other, and leads the flock slowly through them, suffering every one to eat to his liking. This they are suffered to do only when they feed on clayey soils ; when they feed upon lime-
stone,

stone, or other calcarious soils, they never eat salt. In the southern pastures, where they feed in the winter, no salt is allowed them.

These sheep, of which it is computed there are five millions in Spain, travel in flocks of 10,000 each; they are shorn in the beginning of May, and about the latter end of July the rams are turned into the tribes of ewes, regulated at six or seven rams for every hundred ewes. When the shepherd judges they are served, he collects the rams into a separate tribe, to feed apart. There is also another tribe of rams that never serve the ewes, but feed apart also and are kept for their wool, and for the butchery; for though the wool and flesh of the weathers are finer, and more delicious than those of rams, yet the fleece of the ram weighs more than the fleece of the weather, and the ram lives to a greater age. The fleeces of three rams, generally weigh five and twenty pounds; the wool of four weathers, and that of five ewes, will barely weigh as much. Though the flesh of rams is forbidden to be sold, the law is eluded. When the rams lose their teeth they cut them, and when their wounds are healed, sell them for long-wooled weathers.

This account of the management of sheep in Spain, is purposely introduced here, to teach the young farmer the benefit of salt, which preserves the sheep from the rot in rank clayey pastures; and likewise to shew the salutary effects of keeping sheep in exercise, and in an exact temperature; for my author observes, that there is another kind of sheep in Spain, that never travel; these, he says, have coarse, long, hairy wool; the itinerant sheep, short, silky, white wool; and he verily believes, from a few experiments and long observation, that if the fine-wooled sheep stayed at home in the winter, their wool would become coarse in a few generations. If the coarse-wooled

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wooled sheep travelled from climate to climate, and breathed the free air, their wool would become fine, short, and silky, in the same period of time.

One observation more may be necessary, and that is, that before shearing they sweat them plentifully, by crowding them into a close narrow place, where they remain one whole night, and in the morning they are brought forth, reeking hot, as they are wanted, which, as the shearers say, softens the wool, and oils the edges of the shears.

Though incredible sums are gained by sheep in Spain, yet the Spaniards seem totally ignorant of one great advantage, which the English farmer reaps by his sheep; and that is, by folding. Of so great consequence is this practice to many farmers at a distance from other manure, that were it not for the enrichment of the fold, the lands they occupy would not be worth the trouble of cultivation. For this reason, those who live remote from great towns, and have no large wastes or commons in their neighbourhood to assist in summer feeding their flocks, are obliged to make provision for them by laying down some convenient inclosures with white clover, trefoil, and other perennial grasses, in which after brousing on the leys and fallows the greatest part of the day, they bait them before folding time, and by that prudent forecast, are enabled to enlarge their flocks, and by enlarging those, to increase their dressings.

It is not, however, all farmers that are masters of the art of folding sheep, which requires much skill and more attention. Some who have large flocks of breeding ewes, find their advantage in folding all the year; but their profits depend, in a great measure, on the care and vigilance of their shepherds. If sheep are folded in a wet soil, or in wet rainy weather, it is odds but the land and the flock suffer in proportion. If they are folded too close in hot weather,

ther on rich moist ground, the danger is greatly to be apprehended to the flock, though the land will receive no injury ; and if they are folded too loosely, that is, too much room allotted them, very little good is to be expected to the land from their enrichment ; for it is as much to the kindly heat of their warm coverings, that the earth owes its succeeding fertility, as to their manure. The chief art of folding consists in this, to observe as near as may be, to keep the sheep in an exact degree of temperature : To do this, a flock that may require twelve hurdles on a side in the summer, should only have ten in the winter ; and it should be an invariable rule with the shepherd, to open his fold, if heavy rains fall in the night, whether it be hot or cold. If hot, the sheep will disperse and shift for themselves ; but if cold, the shepherd should drive them to shelter. The cribs which I have directed in the preceeding part of this treatise, are admirably contrived for this purpose ; but if no such covering is to be had, the leeward of some warm hedge, bank, or wall, is the most natural shelter, except in driving snows, and then they should be housed if possible.

Some provident farmers, where shelter is wanting upon their farms, sow broom on banksides, or furze in dry corners : For sheep are tender animals, and are neither formed to bear the extremes of heat or cold ; and these defences are of great advantage to them.

It is a vulgar error that generally prevails, that the flesh of sheep becomes more delicate by their feeding on wild thyme, and other aromatics. Sheep will not taste wild-thyme, or any other aromatic, while a blade of natural grass is to be found ; but they will eat almost any thing when driven to it by hunger.

If my young farmer intends to rear a flock, and for that purpose reserves a proportionable part of his
dryest

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drivest and least improveable lands for their summer feeding, let him purchase ewes that lamb early in the spring, not those that lamb in the winter; because the hazard of a miscarriage is greater in rearing winter lambs at first setting out, than in rearing those that drop in the spring; and till some experience is obtained in the management of those tender animals, instructions that are given on paper are but imperfect guides.

C H A P. XXVII.

Of the Improvement of Coppice Ground.

WITH regard to the planting of coppice-wood, I cannot help remarking one general error that runs through almost all the old plantations; not so much owing, perhaps, to the original planters, as to the carelessness of some or of all the occupiers; and that is, the inequality and promiscuous mixture of various kinds of underwood in the same coppice. In planting a coppice-wood, I would observe as much regularity as in planting an orchard, and with respect to the species more; for in the latter it may be very good husbandry, here and there, to intermix among apple-trees a choice pear-tree, but in planting a coppice, I would avoid intermixing hazle among oaks, or willows among ash: not that I would exclude from my coppice, any of the quick-growing trees or shrubs; but I would assign to each species a distinct spot. In planting a coppice, contrary to every other plantation designed for continuance; you cannot sow your seeds too thick, nor plant your sets too close together; but the first I would sow in drills, and the latter I would plant in lines. And before either one or the other was attempted, the land should be well prepared. Wherever it is intended
fully

fully to crop any piece of land, and to employ it to its greatest extent; it is necessary to give it all the advantages of the most perfect cultivation; but where it is intended only to employ a part, it may be equally good husbandry to lock up the stores of the natural soil till the season when the demand for them becomes more urgent. From this consideration, I know it is the opinion of many, that sets of various kinds, and even the seeds of plants will thrive best in unbroken up ground, probably led thereto, by observing that acorns, ash-twigs, hazle-nuts, &c. are most apt to take root, when dropt by birds in pastures, and in hedges, where neither plough nor spade has for a long term of years been employed. But this proves only the power that is exerted by every species of vegetable to produce its like, and that this propensity in nature will sometimes prevail over all impediments. It may, I believe, be fairly presumed, that not one seed in a thousand, thus dropt, arrives at maturity, not even in places the most remote from being disturbed; and, therefore, I think it more reasonable to conclude, that as the plough or the spade is necessary to accelerate and improve the growth of those tender plants that are annually raised for our use, cultivation is likewise helpful in the infant state of the more robust species, to whose support, when arrived at a proper age, these helps are no longer needful. This method of reasoning does not, however, militate what I have said concerning the planting of acorns. The quantity of soil that I have directed to be broken up and prepared for the reception of the seed, is sufficient for the immediate occasion of the young seedlings, and it is to increase their vigour that more is directed, when more is wanted; a small check to a vegetable, like a rising hill to a moving machine, causes an additional exertion

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exertion of strength ; but when the resistance is overcome, the progression becomes more easy. Were all the ground to be broken up on the first planting, the rich moisture in new broken up ground would, before it could be of any use to the seedlings, be exhausted, the ground again consolidated, and the fermentation occasioned by the rotting of the green swart subsided ; whereas reserving these advantages to the third or fourth year, you highly invigorate your plants. The reason is otherwise in planting coppices ; there all the nourishment that can be given is wanted at once ; for which reason, whoever intends to plant a coppice, would do well, during the preceding summer, to stir his ground frequently, and as deep as his whole strength will admit ; and at the same time, that he stirs it, he should fence it, if it is not already inclosed, and that too impreguably. Even hares and rabbits should be excluded from new plantations of this kind ; for, till the plants and sets arrive at a certain size, these animals are very pernicious by nibbling off the tender tops, or the green bark about the roots, where they cannot reach the tops. The seeds and sets proper for a coppice-wood should, as much as possible, be suited to the soil. In rank stiff clay, inclined to moisture, set elm or sow acorns ; in earthy loams full of moisture, beech-mast and ashen-keys ; in sandy loams, nuts, haws, and hips ; in black bogs, set alder, poplar, or the mountain ash ; in springy rich earth, and on the sides of hills the white, or Dutch willow ; in gravelly soils hornbeam ; in ordinary land, the birch and elder ; in stoney and rocky ground, the cork-tree ; in rich land, the holly-tree ; and in black heathy ground, the fir.

I have been the more copious in this catalogue, that the farmer may have variety, out of which to make his choice ; and that the land owner may at the same

same time know how to accommodate his trees, that are to stand for timber to the proper soil.

C H A P. XXVIII.

Of the Business to be performed on a new Farm between Seed-time and Harvest.

WHEN all the different seeds are in the ground, and the crops are by slow degrees advancing to maturity; farmers teams in general are employ'd in a variety of necessary articles, such as mending roads, carrying out stack-wood, delivering in hay and straw to inns and other customers, bringing home coals, carting timber, dressing fallows, trenching and draining wet lands, making composts, and many other articles not easily recollected.

Our new farmer, however, having neither hay nor corn to carry, nor fallows to prepare, nor perhaps stack-wood to dispose of, should now make the best use of his leisure in accumulating materials of every kind for enriching his compost heaps. It is bad economy to carry for hire, except sometimes in back-carriage; and a farmer must be a novice, indeed, who cannot employ his teams to better advantage than either working upon the highways, carting coals, bricks, timber, or any sort of building materials, except such as may be wanted for the use of his own farm.

Besides providing manure, a new preparation for turneps must not be neglected. If his winter vetches are eaten off, he must plow in the dressing, and lay on a half dressing besides; and, if any inclosures still remain unplowed, which are intended for arable, if they are proper for turneps, they should now be prepared for that purpose.

If chalk is to be fetched from any distance, tho' this is not the season to lay it on, it is yet the season to bring it home, and to cover it with earth to preserve its moisture.

Now is the busy time to destroy weeds; but as the plowmens time must not be spent in labours distinct from their horses, if any roads of communication are wanted within their own farm; now is the time to make or repair them. Time cannot be better employ'd than in this service; for no slavery is so great as that of constantly dragging in dirt and mire.

If land-ditching should be found necessary, now too is the proper time to provide a stock of stones or pebles to fill up the drains; and, if open trenches are wanting to drain any bog or swamp; this is, likewise, the time when all the horses can best be spared to give the trenching plough its full effect.

While the plowmen are thus employ'd, all the other servants are likewise to be kept at work. The new fences now require to be carefully cleansed and weeded, and the earth thrown up to the roots of the thriving quick; beans and peas are now to be hoed; wheat and other corn to be weeded; and wherever weeds grow, they should now be cut down to prevent their seeding. The occupier of a new farm should be particularly careful to prevent the incroachments of weeds; for if once they are suffered to predominate, it will not be easy to root them out.

If ponds are to be made in the corners of fields, for the convenience of water for the cattle, now is the season for that service.

It were endless to recount the multitude of articles, that continually require the vigilant eye of the industrious farmer, to watch that none of them are neglected.

Now is the time to provide saddles and beams for building of ricks in the harvest; and now is the
time

time to lay in straw for thatching those ricks. All corn should be thatched as soon as ricked, or the former labour of the husbandman will avail but little if heavy rains fall to soak through the sheaves.

When July arrives, the utmost attention should be paid to prepare early for turneps; the fresh broken up ground should be sown first, and then that on which the vetches grew. My reason is; that, if the first sowing should fail, there may be time sufficient for a second trial; and, if that too should fail, there will still be a good tilth for wheat.

When harvest approaches, then is the time, if it has not already been thought of, to provide a number of hands in proportion to the quantity of corn to be cut down and carried. And it will be good husbandry, if the weather be fine at first, to rick your wheat as it becomes ready, and reserve your barn-room for oats against a more catching time.

C H A P. XXIX.

Of the Business to be done on a new Farm in Harvest.

IN providing hands for harvesting, you should calculate to have all your corn cut in five weeks, and carried in six, if the weather permits. If you have sixty acres of wheat, ten good hands will be twelve days in reaping, binding, and shocking them, and longer than twelve days your wheat should not be in reaping: if you have seventy acres of oats, and eighty acres of barley, four men will be four and twenty days in mowing them; and, if you have forty acres of pease, and forty of beans, your ten reapers will be fourteen days in hacking them. Thus, allowing some days of intermission on account of rain, fourteen men will cut down 290 acres of corn in five weeks, or thirty working days.

Again,

Again; supposing that wheat yields a waggon load and a half upon an acre, and those to be carried three-quarters of a mile upon an average, 90 loads of wheat, with four teams, will be four days full carrying; for this service twelve men will be wanted, four in the field, and eight at the ricks, two of which ricks must be raised at a time.

The oats and pease should be housed in the barns most able to shed; the beans and barley will bear being longest in the field, and may be the last carried.

Seventy acres of oats will produce upon an average 175 loads, that is, two loads and a half upon an acre; four teams, viz. two waggons and two carts will be seven days in housing these at the distance of half a mile: to these four teams, four good rakers will be wanted, four pitchers and four loaders; and four men at the mows, with two horses to tread the mows, and two boys to guide them. And while the oats are housing, two thatchers with their helpers must be employed in thatching the wheat, which at 23 loads, in a rick will make four handsome ricks.

There is no ascertaining the order in which corn is to be carried, because that must in a great measure depend upon the order in which it ripens; but the first care of the farmer is, if he can, to secure his wheat, that being his most valuable crop; his next care is to house his oats, because they are apt to shed; his third object is his pease for the same reason; next to his pease his barley, which if not cut down will take very little harm, let the weather prove as it may; and his last care is his beans, as they, if cut, bound, and set up, are proof against all weathers.

Every bay of a barn of the dimensions I have allotted (p. 40, will, according to my calculation, contain 25 loads; and as there are ten bays, such a barn will contain 250 loads, 175 of oats being already housed, there will only remain room for 75 loads of pease.

Forty

Forty acres of pease, however, will probably produce 120 loads; and therefore, 45 loads will remain to be stacked. The forty acres of pease will want very little raking; but 120 loads will take up five days to house and rick them; the spare hands that were used as rakers will now be usefully employed in turning and ricing the barley, eighty acres of which may well be supposed to produce at least 200 loads which will employ the farmer's full strength for nine days in carrying and setting up.

It remains now only to bring home the 40 acres of beans. If they produce 60 loads, they will be three days nearly in bringing home and ricking, in which time all the hands may be usefully employed in helping the thatchers, clearing the barn-floors, and pulling and trimming the ricks.

To sum up the whole, the harvesting of 290 acres of corn will stand nearly thus: fourteen reapers and mowers 30 days: sixteen loaders, rakers, &c. two thatchers and four helpers: two teams; eight horses.

The whole expence of harvesting may be estimated as follows:

Fourteen reapers and mowers, at 3s. each, amount to two guineas a-day, for 30 days,	}	£1 s. d. 60 : 0 : 0
Sixteen pitchers, loaders, rakers, &c. at 2s. 6d. each, 2l. a-day for ditto,		
Two thatchers, at 3s. each, 6s. a day,	}	9 : 0 : 0
Four helpers, at 1s. 6d. each, 6s. a-day,		
		9 : 0 : 0

Whole additional expence, £. 141 : 0 : 0

I have charged this additional expence, because I would not have the ploughing for a future crop retarded; for as only eight horses are all that are necessary

fary for four carriages; one plough or two should be kept going as fast as the corn is carried off, particularly on the pea-ash, which with a good dressing may be prepared for wheat; that which was oats may be prepared for rye, to be fed off early in the spring, and prepared for turneps for another year; that which was wheat may lie for oats; that which was beans may be prepared for barley and seeds; and that which is now turneps may be fed off and sowed with pease or beans. Thus a future crop may be provided for; but neither the wheat will succeed without dressing, nor the oats, nor the barley and seeds; so that tho' the first crops may be supposed to be moderate crops without dressing, the young farmer will be convinced by his future crops, how necessary it was for him to employ his teams in accumulating a large stock of good manure for the year to come; for let him be assured of this, that two successive crops will never be obtained at first from the best land in the old husbandry, tho' I cannot speak so positively with respect to the new.

I said, that harvesting 290 acres of corn, would cost 141l. additional expences, and I am inclined to believe it will not amount to much less notwithstanding that most of the house-servants, two plowmen, and two boys excepted, may assist on that occasion; for having charged nothing for beer and victuals in my estimate, those two articles will fully balance the labour of the house-servants.

The reader, however, has often been reminded, that I do not aim at exactness, only to give a rough sketch of the expences of farming, as well to give the young farmer a notion of the first charge that he may provide accordingly, as to shew gentlemen that all is not gain that is returned by farming.

C H A P. XXIX.

The advantages of the old and new Husbandry.

IN the cultivation of lands, it is yet undecided, whether the old or the new husbandry is the most profitable ; yet if we may be allowed to judge from the general disregard paid to the new husbandry by the practical farmers, who are as keen a set of men, collectively considered, and as ready to embrace every project where the prospect of success presents itself, as any other class of men in the kingdom ; and if we consider farther, the little success that has attended the practice of it, and the slow progress it has made both here and abroad, under the direction of gentlemen of the first eminence ; we need not hesitate a moment in the present improved state of agriculture in this kingdom, to pronounce in favour of the old. But at the same time, it must be acknowledged, that the principles upon which the new is founded, are just in themselves, and that the practice only, being less simple and consequently less accommodated to the genius of those who are bred to common labour than the old husbandry, is the great impediment to its advancement, and were there no other, would long prevent it from becoming the common husbandry of this or any other country.

But there are some other objections to the general practice of the new husbandry, which I shall here enumerate, and,

First, Mr. Tull the father of this husbandry, acknowledges that in making the instruments necessary for carrying it on, no less than five distinct tradesmen are required, all of whom are to be taught by the undertakers ; and how difficult and expensive it is, first, to teach, and then to satisfy all those different workmen

for their time, every one knows who has employed them. It is no wonder then that common farmers do not engage in this complicated business, and that gentlemen, who do engage in it, are tired of the impositions they must daily submit to in the prosecution of the new system, as well from the workmen they employ in making the instruments, as from the servants they hire to use them. This objection Mr. Tull himself has suggested, and acknowledged in its full force.

I am aware, however, that to obviate the first part of the objection, the laudable society for promoting useful arts, have taken upon themselves the first cost of making any new instruments that may be contrived to facilitate the progress of the new husbandry; yet, I do not find that a complete set has ever been contrived upon so plain and simple a construction, as are these of the old, and till that is accomplished, it may reasonably be presumed that the new husbandry will never universally prevail.

Sir Digby Legard indeed has commended Mr. Tull's drill-plough, and with it seems to have adopted M. Du Hamel's hoe-plough. The first, he says, is made in his neighbourhood for fifty shillings, and the latter for thirty; both, he adds, work well. It would certainly be of considerable advantage to the new husbandry, if the honourable society of arts would cause a number of these instruments to be made, and one of each sent to the Town-hall in every county town in England. The expence would not be great.

In the second place, by the very nature of this husbandry, weeds must increase in proportion as the space allotted for them is to the space allotted for the grain that is sowed, which is as 70 is to 4. Unless therefore, some instruments are contrived more effectually to destroy the weeds, and to prevent their increase, than those in present use, the expence of displacing them

them by the horse hoe, and by the hand hoe, must exceed the ordinary expence in the old husbandry of ploughing, sowing, and harrowing the whole crop.

That this is no exaggerated account, let us admit, that every acre of wheat requires but six horse-hoeings, (Mr. Tull says eight,) what with the care necessary in those operations to prevent the rows from injury, either from trampling by the cattle, covering with the earth of the furrow, or tearing up the plants by the plough, (all which are irreparable in a drilled crop) these six hoeings cannot be estimated at much less expence than three plowings; and when those hoeings are performed by men and cattle in the intervals, if the partitions are neglected to be hoed by hand, the whole labour, so far as it respects the destruction of weeds, will be to no purpose; for the partitions will supply seed enough for double the quantity of land; tho' almost the whole of it, as has been already shewn, is left in a proper state for their reception and propagation. If the partitions are hand-hoed as often as the intervals are horse-hoed, the expence in most situations will be amazingly enhanced; nay, I will venture to say, were the new husbandry in general practice, could not be done in the present method of hand-hoeing at any price for want of hands to perform it, and then, after all, supposing both the intervals and the partitions were to be properly hoed, if the rows were permitted to remain unweeded, (and the weeds in the rows, it must be noted, are all to be pulled out by hand) they of themselves would be sufficient to stock the rest of the ground.

But it may be said, that this labour being once or twice well performed, such a riddance will be made of these avowed enemies to corn, that very little trouble will be necessary to root them out finally by a vigorous prosecution of the new husbandry. Be it so; but even then all the operations necessary to subdue the weeds,

weeks, must be repeated in order to pulverize the ground, or the succeeding crops will perish for want of nourishment. A task however, that few farmers will care to undertake, and I believe no servant will be found to continue; for tho' Mr. Tull says, that six acres of this work may be performed in a day by beginning at five in the morning, and working six hours with one set of oxen, and then lying by an hour or two, and working six hours more with another set of oxen, yet I believe such a servant as will make this his daily practice will be very rare to be found; and, if the success of the new husbandry must depend upon this kind of service, it will not in the end enrich the undertaker.

Thirdly, but it is said, that no man could be a better judge than Mr. Tull, who practised it thirteen years, of the expence of the new husbandry; of the conveniencies and inconveniencies that attended it; and of the advantages that upon the whole accrued, or were likely to accrue from it; and as no man has dared, not even the greatest enemies to his husbandry, to call the veracity of the great father of it in question, his representation of it ought to silence the voice of opposition, and that no man who cannot think so highly of it as to become a convert to it himself, should presume openly to avow his dislike, or endeavour to dissuade others who may be inclined so to do from giving it a fair trial.

Far, very far, be it from me to insinuate the least shadow of reproach upon the character of a worthy man, who whether his husbandry is advantageous or disadvantageous to the undertakers, deserves highly of his country for endeavouring to establish a more rational system of agriculture, than had ever been practised before, upon principles the most natural, and at the same time the most eligible, provided they had been found easily practicable.

But

But as he has given us a comparative view of the advantages of his own husbandry over that of the old or Virgilian husbandry, as he calls it, let us attend to the facts, and make a few observations on his manner of representing them.

1. "The Virgilian, says he, is commonly late in his sowing, because he cannot fallow his ground early for fear of killing the couch and other grasses that maintain his folding sheep, which are so necessary to his husbandry."

OBSERVATION. Will any man say, that this is a candid representation of the general practice of the best husbandmen. If it is not, to what purpose is it introduced?

2. "When his wheat is sowed late, it must *not* be sowed dry, for then the winter might kill the young wheat; neither can he at that time plow dry and *sow wet*, because he commonly sows under furrow, that is, sows his seed first, and plows it in as fast as it is sown."

OBSERVATION. To understand this objection to the old husbandry, Mr. Tull had before asserted, that tho' land designed for wheat should be plowed dry, yet the seed should not be sown till after the surface had been mellowed by rain, nay not if rain should not fall in many days. Tho' this position will admit of debate, yet admitting it to be just, the inference he has drawn from it in opposition to late sowing, can have no weight, namely, that the Virgilian, if he sows late, *must not sow dry*, lest the winter should kill his young wheat; because the very reverse is found by experience to be the fact. The late sower, if he can find a dry season to put in his seed, need not fear its being killed in the winter for want of wet.

3. "If he sows early in light land, he must not sow dry, for fear the poppies and other weeds should devour his crop."

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OBSERVATION. One would rather think he means to say, he must not sow wet, for the reason assigned. But poppies are only local annoyances, and troublesome chiefly to some light soils, but not to one acre in twenty the kingdom through.

4. "If his land be strong, *let it be sown early, wet or dry*, 'tis apt to grow so stale and hard by the spring, that his crop is in danger of starving, unless the land be rich, or much dunged; and then the winter and spring proving kind, it may not be in less danger of being so big, as to fall down and be spoiled."

OBSERVATION. If all this were true, the old husbandry farmer could have no chance for a crop; and yet a thousand years experience has proved the contrary.

5. "Though no other impediment prevented his plowing deep and sowing wet, it is seldom he has time to do it in; for he must plow all his ground, and yet whilst it is wet must lye still with his plough."

OBSERVATION. Mr. Tull seems to take it for granted, that the Virgilian has only one sort of land to work upon, and upon that principle to make *that* essential to a good crop, namely, plowing dry, and sowing wet, which all farmers disregard.

6. "When he sows under furrow, he fears to plough too deep, lest he bury too much of his seed; and, if he plows shallow, his crop loses the benefit of deep plowing, which is very great."

OBSERVATION. To obviate this objection, the farmers in Oxfordshire, where Mr. Tull first began to practise husbandry, plow one cast under furrow, and another upon the tilth. Whether they assumed this practice on the suggestions of Mr. Tull, or whether the like practice is the custom elsewhere, I have not yet been able to determine. Be that as it may, Mr. Tull's objection can have no force; for the Virgilian

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gilian plows his land deep when he sows it; and only plows shallow, when he sows his seed. The Tullian husbandman does the same, when he plants with his drill-plough, 189

7. "When he sows over furrows, he must harrow the ground level to cover the seed, and that exposes the wheat the more to the cold winds, and suffers the snow to be blown off it, and the water to lie longer on it, all which are great injuries to it."

OBSERVATION. That land lying rough, should discharge the water from it sooner than land harrowed smooth, is a position not readily to be admitted; and, indeed, all Mr. Tull's objections, separately or collectively considered, amount to no more than this, that some inconveniences are *sometimes* seen to attend swards in the old husbandry; but seldom men of industry. It is moreover highly probable, that most, if not all, the objections against the *old husbandry* above enumerated, were purposely introduced, in order to afford an opportunity of displaying the advantages of the new; it would, therefore, be very unfair, in our enquiries after truth, to conceal any thing that might tend to obstruct the discovery of it. Let us, therefore, hear all that he has said in favour of the new husbandry.

Our hoeing husbandry, says Mr. Tull, is different in all the fore-mentioned particulars.

1. "We can plow the two furrows, whereon the next crop is to stand, immediately after the present crop is off."

OBSERVATION. This is most undoubtedly a great advantage.

2. "We have no use of the fold; because our ground has annually a crop growing upon it, and it must lie still a year if we would fold it, and all the good the fold could do the land, would be

“ be only to help to pulverize it for one single crop,
 “ its benefit not lasting to the second year. And so,
 “ we should be certain of losing one crop, for the
 “ very uncertain hopes of procuring one the ensuing
 “ year by the fold; when it is manifest by the ad-
 “ joining crops, that we can have a much better
 “ crop every year without a fold or any other ma-
 “ nure.”

OBSERVATION. Does not Mr. Tull in one case manifestly diminish the advantages to the old husbandry from the fold, by confining the virtue of it to one year; and, in the other, does he not as evidently enhance the advantages of the new husbandry, by saying, that the practicers of it can have better crops every year without a fold or any other manure, than their neighbours can have with them? The Virgilian's land must be very poor indeed, if this should generally be the case. Sir Digby Legard, who is a great friend to the Tullian husbandry, has experienced no such superiority.

3. “ We can plow dry, and drill wet.”

OBSERVATION. Farmers in general do not approve of this practice. And Mr. Tull's land must have been, as indeed it was, of a very peculiar cast, to be able to do this. If his land had been stiff clay, could this have been done?

5. “ He fears the weeds will grow to destroy his
 “ crop. We hope they will grow to the end we
 “ may destroy them.”

OBSERVATION. But is not the destroying them attended with much labour and expence, as well in the new husbandry as in the old. I am very apt to suspect, that this observation is introduced for the sake of the antithesis. In the old husbandry the crop itself will sometimes destroy the weeds; in the new husbandry the weeds, if not removed, will destroy the crop.

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5. "We do not fear to plant our wheat early,
" so that we plow dry, because we can help the
" hardness or staleness of land by hoeing."

OBSERVATION. Admitted. But does not the moisture proceeding from a rich full crop in the old husbandry, contribute in a great measure to soften and enrich the land, and to render hoeing less necessary? Be that as it may, will the benefit from hoeing compensate for the waste of ground unoccupied? I much doubt it.

6. "We can plow our land wet or dry, because
" two furrows only being necessary for drilling, the
" rest of the land may be plowed at any time."

OBSERVATION. This is a most manifest advantage, and some such advantages must attend the new husbandry, or it would soon be wholly exploded.

7. "We never plant our seed under furrow, but
" just at what depth we please, about two inches,
" and then there is no danger of burying it."

OBSERVATION. But is there no danger of having it eaten up by rooks, and other devouring creatures, who when they have discovered a row will pick up every seed, and leave none to grow?

8. "We not only plow a deep furrow, but also
" trench-plow to the depth of two furrows where
" the land will allow it, or where the staple of the
" land is too thin or shallow; we can raise it, by
" plowing one furrow over another before we drill
" our seed. We can also raise a high ridge in the
" middle of each interval above the wheat in the
" winter, to protect it from the cold winds, and to
" prevent the snow from being driven away by them;
" and the furrows or trenches from whence the earth
" of these ridges is taken, serves to drain off the water
" from the wheat, so that it being dryer, it must
" be warmer than the harrowed wheat."

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OBSERVATION. All these advantages are admitted ; and these are all little enough to preserve it through a rainy winter ; for if the rows happen to lie under water any time, and are chilled, there is no spare seed to supply the loss. There is a gap in the crop, and it is no unusual sight, to see many such in a drilled field of corn, from this, as well as a variety of other causes ; as the carelessness of the driller in not supplying his hoppers, the defect of the drill-plough in not discharging the seed properly and regularly, the breaking in of cattle and sheep, the ravages of fowls, hares, and vermin, the rigours of the season, and the accidents from many hoeings and weedings of burying the grain in the rows, or the trampling of it under foot ; against all which, the scantiness of the seed sown, and the space on which it is sown, are very ill calculated to provide.

Were it not for these, or incidents like these, can it be supposed, that a gentleman of Mr. Tull's unwearied application and acknowledged abilities, could occupy a farm of 200l. a year, of his own estate, with all the superior advantages above enumerated, without enriching himself by the profits of his labour ? Whoever was acquainted with Mr. Tull, must know that during the latter part of his life, his manner of living was quite in the farming way. He eat his own brown bread, fed his own bacon, killed his own mutton and poultry, made his own wine, and was at very little expence for luxuries which his own farm did not produce. He likewise, having all the materials on the spot, followed the trade of a tyle-maker, and kept no man servant that was not employed either on the farm, or at the tyle-kiln ; and yet with all these advantages, and all this oeconomy and frugality, he did not by any means improve his fortune, though he might die without impairing it,

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His ill health, and his ill success at first setting out, and the consequences that very naturally attended both, that is, a diminution of his paternal estate, were provided for before he retired to Prosperous; and he had, like a worthy man, discharged every incumbrance, before he entered upon a new attempt to retrieve his character, as a projector, by a more vigorous prosecution of his favourite scheme. His health he had in a great measure established by a journey into Italy, and by a three years residence there, and in the south of France; and he had so far improved the ideas he had at first conceived from the vineyard culture, by diligent attention to the effects of it in the country where it was universally practised, that he returned in full confidence of regaining all he had lost, and of introducing a most beneficial method of husbandry into his own country.

With this view, on his first arrival, he applied himself principally to the reforming his instruments; but when he had perfected them to his mind, he had still another difficulty to surmount, and that was, the teaching an untractable set of men the use of them. In the prosecution of these necessary requisites, he met with many mortifications, and not a few disappointments; yet he proceeded with the firmness and resolution of a man perfectly convinced of the rectitude of his intentions, and the justness of the principles upon which they were grounded: And it must be said, to his praise, that he had well nigh surmounted every obstacle when old age and the infirmities that accompany it, hastened and increased by a life of daily activity, and nightly study, (for he attended his servants closely in the day-time, and wrote in the night) had so broken his constitution, that he had determined to relinquish business, and devote the remainder of his life, to the duties of religion,

ligion, and the necessary indulgence of a richer dyet, and a more enlarged society ; but he lived not to accomplish what he so justly merited ; for he died incumbered with his farm, and if I am rightly informed, left his sister-in-law to succeed him.

This little history of Mr. Tull, a most indefatigable devotee to the science of agriculture, would never have appeared, had it not been impartially to report the difficulties attending the introduction of a practice, which, with all the advantages of learning, ingenuity, and attentive application, could not be said to succeed under the direction of the author of it, till after he had wasted much of his substance, and impaired his constitution, in the prosecution of it.

That Mr. Tull lived to convince his friends, and indeed, the learned in general, of the truth of his theory, cannot be denied ; but that practical farmers were ever of the same opinion, is by no means clear ; they have, indeed, admitted in part, what he advanced in the gross, that some kinds of grain may be *planted* to advantage ; and that hoeing, in whatever manner performed, is a benefit, not only to the present, but to the succeeding crops ; and, in consequence of this concession, they have planted beans by hand, and hood them in the same manner ; and have ingenuously acknowledged the advantage reaped by that expensive method ; yet I do not know one, who has yet introduced the horse-hoe ; and till practical farmers can be made to believe, that by sowing four inches out of seventy-two inches of their land they will be gainers, and are persuaded to make the trial, I beg leave to doubt the reports of gentlemen, who seldom are so exact in computing their expences, as those are who are to get a living by their labour.

It is the impracticability of the new husbandry, or to speak with more precision, the difficulty of conforming

conforming so exactly to the rules that are prescribed as necessary to insure success, that I endeavour to combat, and the many more dangerous accidents that it is liable to, than is to be apprehended by following the best practice of the old husbandry. Till these difficulties are surmounted, and these accidents by that means rendered less frequent, I would advise the young farmer to continue the old husbandry; but at the same time to endeavour to form his notions on the best models of the most successful practitioners.

It must be acknowledged, that even the old husbandry has received no small improvement by the discovery of the genuine principles of the new. The advantages of meliorating and pulverizing the earth are better understood, and I believe more generally practised than formerly; and the grand principle of all, that of frequently stirring, exposing, and enlarging the superficies, in order to supply in some measure the place of dung, is a discovery of vast importance.

While we hold these principles in view, we cannot go far astray, for all that seems necessary to be done, is to keep our land in such a kind of temperature, as neither to be too hot nor too cold, too loose nor too much bound; too wet nor too dry, too light nor too heavy; but in all our improvements to endeavour to approach as near as possible to that happy mixture which nature has exhibited to our imitation in the rich meliorated black mold already described; that whether it is wrought by the spade, or barely turned up by the plough, displays its fertility by a voluntary discontinuity of its parts, and a grateful discharge of its fragrance.

This seems to confirm to us the justness of the Tullian principles, by pointing out the necessity of sweetening and meliorating our land, by frequently exposing

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exposing it to the action of the sun and air, and of separating its parts by repeated plowings. Hence we may learn that in preparing our land for any kind of grain, we should be less sparing of our labour than of the dung cart, and that of all composts those of earths with earths are the most natural.

These observations tho' they may be looked upon as a digression, are not wholly impertinent to the subject, and may be of use in the right management of that variety of soils that continually require the correcting hand of the intelligent occupier.

END OF THE FIRST PART.

1. **IN THE CIRCUIT COURT OF THE FIRST JUDICIAL DISTRICT OF FLORIDA**

Added to these, I have examined the merits of the new husbandry, and endeavoured to shew wherein it excells, and wherein it falls short of the old husbandry.

In this second part, I propose to treat more precisely of the culture and improvement of every distinct species recommended in the former part, not from my own experience only, but from the observation and experience of those likewise, who have made the practical part of farming their chief employment. And in the prosecution of this useful subject, I shall endeavour to lay before my readers the best methods of practice in the new husbandry, as well as the old, and shall impartially, and I hope clearly explain them to the understanding of those for whose use they are principally intended.

C H A P. I.

Of *Wheat*.

WHHEAT is, of all other grain, the principal subject of the English farmer's attention; it is now almost universally our bread-corn, and it is besides a capital article of commerce, by which the national wealth in plentiful years is more enriched than by the balance of all the other articles of our commerce added together; for, except our pottery and woollen manufactory, every other article of our commerce has its foundation in the produce of other nations, but the article of corn is all our own. One million, therefore, brought into England for corn, doubles its value, *in a national sense*, to the same sum brought in for those manufactures whose raw materials are purchased for ready money abroad.

To the cultivation therefore of this great source of our public as well as private wealth, let us apply with unremitting diligence. Those who oppose the bounty on the exportation of corn, should consider that the more the merchant receives on this account, the more money he brings back in return; and that

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all this money is circulated among ourselves, without one penny of it being carried away for any one material whatever. But to proceed,

Of wheat there are varieties, as of every other species of vegetable; but that which is commonly cultivated in England, may be divided into two distinct kinds, the naked and bearded; or, as some affect to call them, the Lammas and Cone; of the Lammas, there are the red, the white, and the yellow; to which farmers add the pirky. Of the cones there are the white and the grey, to which likewise they add the duck-bill. Of all these wheats the red Lammas has generally the preference at market; next to the red, the white; and next to the white, the pirky, which differs only from the white by having a single chaff to cover the grain; whereas the grain of the white is defended by two or three. Of the cones, the white and the grey are in equal esteem; and are both cultivated to great advantage in the midland counties for home consumption, tho' not much purchased for exportation.

Other varieties known in England, are distinguished by the names of bright-eared, double-eared, summer wheat, soft wheat, Tripoly, Sicilian, Polonian, and Smyrna wheats. As this last differs from all the rest, a more particular description of it may be necessary.

This kind of wheat has one very large ear in the middle, round which a number of smaller ears shoot forth and form a bunch; so that were our land rich enough to bring this sort of wheat to perfection, it would be the most profitable of all the others, as it would by its particular structure produce by far the greatest crops; but some who have tried it, find, that tho' it will do very well in the rich soils of our gardens, if cultivated with all the care of a foreign plant, yet it will not do in our common fields.

The universal practice therefore, with a few exceptions, is confined to the kinds I have first mentioned, and chiefly to the red and white Lammias, and the white and the grey Cone, in the cultivation of which, I know no material difference. The smooth in most places bears the better price, the bearded the better crop. The grey Cone, if we prefer Miller's opinion to that of Mr. Tull, is best for the new husbandry, but the practice of Mr. Tull gave preference to the white.

The time of sowing wheat is very uncertain; from the latter end of August, to the middle of November, and when the autumn has proved unfavourable, some have sowed in February, and reaped good crops.

Having already considered the comparative advantages of the new and old husbandry in the former part of this treatise, I shall now proceed to shew the manner of cultivating wheat, according to the best practisers in both. And first of the New.

Mr. Tull, I believe, is universally acknowledged to be the greatest master of his own system, and to practise it to higher perfection, than any who have yet attempted to follow him; and as he made wheat his chief dependance, his manner of managing his lands to produce it, is certainly the best rule for pursuing his husbandry.

In his management of this species, his notions were just. Before he attempted to introduce the drill, he was careful to clean his fallows by every possible method; such as plowing, harrowing, raking, and burning the weeds, sowing turneps, hoeing them often, feeding them off early, and plowing his furrows deep. The ground being thus prepared, he marked his inclosures at equal distances, and plowed them into LANDS of six feet each. To deepen the soil in the middle of these LANDS, and to heighten the ridges for the benefit of laying the rows dry in the winter,

winter, he occasionally ordered his plowmen to lay the second earth over the first, and having plowed the middle space in each LAND by two bouts, he proceeded to drill in his wheat, and suffered the intervals to rest till all his seeds were sown, or so long as the season continued favourable for so doing; and then as convenience suited, he caused a deep furrow to be struck on the outside of his drilled rows, which left them elevated during the winter, and till the spring began to rouse up the weeds. The furrows that formed the trenches on each side the rows, were heavy ones, and the earth in coming up one furrow, met the earth turned over in plowing down the next furrow, and formed an acute ridge, and by means of a plough with a double mold board, a deep trench divided these ridges, and left a sharp ridge on each side. Thus every six feet land consisted of an obtuse ridge of about eighteen or twenty inches in the middle, a deep furrow on each side of that, and two acute ridges, one on each extremity, as in the margin. It must be



owned, that no form could be contrived by the art of man, more proper than this for preserving the tender wheat from the injury of wet in the winter, and it seldom failed to have that effect, except when the incessant rains fell so heavy as to wash down the earth from the roots of the plants in the rows, into the furrows on each side, and by that means exposed them to the inclemency of the weather. The remedy in this case was, as soon as the weather would permit, to edge a small portion of the base of the inner acute ridges, with a narrow molded plough towards the rows; and when in the spring, this earth began to send forth weeds, Mr. Tull's method was, before he filled up the furrows next the rows, to enlarge them a little, by plowing as near to the rows as the plough could go without hurting them,

them, and having as it were turned all the weeds to the left side, he then ordered his plowman to strike a large deep cast into the furrow next the rows, by which the weeds that had been thrown by, as has been said, were buried at the bottom, and the fresh pulverized earth brought to nourish the plants that all the winter had remained in a manner bare, or but slightly covered.

This was the manner of the first spring hoeing, and it had always a wonderful effect in forwarding the growth of the young plants.

This hoeing was performed sooner or later as the season permitted. The second spring hoeing closed the remaining earth of the acute ridge to the first, and left a deep and wide trench in the middle of the intervals, which divided the six feet Lands from each other.

The third spring hoeing depended, as the former, on the weather; for all the hoeings were performed when the earth was moderately dry, by which means the weeds were more effectually destroyed, and the salts of the earth more copiously supplied for the nourishment of the plants.

This third hoeing was performed in a peculiar manner, as well as the first and second; for as the fibres of the roots had now acquired considerable strength, and were known to have extended a considerable way into the intervals, Mr. Tull judged it improper to tear any considerable number of them off at once with the plough, and therefore his instructions to his plowman were, to keep at a greater distance from the rows, and to depress his left hand, that by the slant position of the plough, the share might pass over the lowermost extended fibres without hurting them, and at the same time by loosening the earth above and beyond them, lessen the impediment that might have retarded their farther extension.

After

After this hoeing, the plants were suffered to remain a shorter or longer time, according to the appearance of the crop, or the increase of the weeds: If the plants appeared sickly, they were immediately restored to health by the application of the hoe; or, if the weeds had gained ground, they were removed by the same means.

The last hoeing, however, which was sometimes the sixth, or even the eighth, was always performed as soon after the wheat was out of blossom, as the weather would permit. This hoeing Mr. Tull esteemed one of the most essential; and yet it has been strongly objected to by a subsequent writer, as will be shewn hereafter.

With respect to hand hoeing, Mr. Tull made little account of it; and it may be, after many repetitions of the horse-hoe upon the same land, that the quantity of weeds which grow in the partitions, that is, between the rows, might not require that operation to be much regarded; it will, however, on the commencement of a course of this husbandry, be equally necessary with horse-hoeing; for, if the weeds are suffered to shed their seed between the rows, they will so stock the intervals, that no small labour will be necessary to root them out.

It remains now only to speak of the method of preparing his land for the succeeding crop; and that requires particular attention, as on the exact performance of it, the success of the crop in a great measure depends.

I have already said so much of the deep trench or furrow that divides the LANDS, as they are commonly called in the common husbandry, that I shall be perfectly understood, when I say, that in the careful filling up of this trench, the plowman's chief excellence consists, as on the faithful performance of this

this operation, the great advantage of the Tullian husbandry is manifest.

To do this, Mr. Tull's instructions to him ~~was~~ to take a large and deep furrow on each side, and to cast them so as to meet full in the middle of the trench, by which a copious portion of well pulverized earth was thrown together, upon which the grain at the proper season was to be drilled; to this the plowman was to continue to land his furrows till he came to the stubble of the newly-cut wheat, which he was directed not touch till the seed was drilled.

As this plowing was performed as soon as the crop was cut; the land thus plowed, lay to enrich itself till the season for drilling approached, when a furrow was raised over the already levelled trench, and the intervals on both sides so far earthed up to it, as was sufficient to form the obtuse ridge on which the wheat was to be planted.

This Mr. Tull particularly directs to be done when the ground is dry; but he at the same time cautions the husbandman not to drill till the ground is moist; when that lucky time arrives, you are then to smooth the ground a little with a light harrow, the horse that draws it walking in the furrow, so as not to trample the ridge.

The land thus prepared, Mr. Tull says, 24 acres of wheat *may be* planted in one day with a drill-plough that plants two ridges at a time; an amazing quantity indeed! When the ridges were planted, he then directs the partitions of the former crop to be plow'd; the stubble of which, if plowed in before, would have obstructed the drilling; but now being divided one part to one LAND, and the remaining part to the LAND adjoining, that which was the ridge of the preceeding crop becomes the trench or draining furrow of the present. In this manner the land lay altogether till the blades of wheat began

to

appear green; and then, when the rows were all in full verdure, the first or winter hoeing was performed in the manner above described, which completes the general process of the Tullian husbandry with respect to wheat. Mr. Tull condemns the practice of feeding off wheat in the spring with sheep, and asserts that sheep never eat off the green blades in the rows of his wheat without destroying half the produce.

Those who would be satisfied of every little nicety, must consult Mr. Tull's book of horse-hoeing husbandry, which in truth deserves to be more generally read, than, I believe, it has hitherto been.

It is not, however, to be doubted, but that among the number of those who have read and studied this husbandry, some gentlemen may have from their own experience added useful observations, which might have escaped the notice of the inventor. Among these, in the course of my reading, I have only met with one whose superior knowledge appears conspicuous; for as to the books that have been written by the foreign disciples of the great Master, though they may amuse, and perhaps inform the husbandmen of the respective countries for whom they were intended; yet I will venture to assert, without fear of contradiction, that they have not advanced the science of agriculture, as understood and practised here in England, one single step.

The gentleman to whom the public is indebted for the most valuable improvements of the Tullian husbandry that I have yet met with, is one, who under the signature of E. S. has published in the *Museum Rusticum* some experiments for ascertaining the comparative weight of the grain, chaff, and straw, in a crop of wheat, with valuable hints towards attaining heavier crops. The experiments are curious, but the hints are sensible and striking; and, what is highly to be commended, where he finds it neces-

sary

say to contradict his master, he has the modesty to conceal his name. Speaking of the growth of wheat in the field, "it is certain, he says, that the ears in general do not arrive at the size that they are naturally capable of; and, if it were known at what period they are formed, the stinting them might in some degree be prevented. That there is some such period in nature, may appear from other circumstances in the growth of this plant. There is a particular season for its tillering or branching; another for its upright growth, and one for its blossoming and forming the seed, and probably one also for the ear being formed; and the growth of it in respect to each of these may be promoted by culture, or retarded by a defect of nourishment at these periods."

When the season of tillering is past, no culture will make the plant throw out more branches; and after the ear is shot forth, it is impracticable to make it larger, that is to say, to encrease the number of *chefts*. Again, when it has blossomed, no art will cause the stem to rise higher. And last of all, after the time of blossoming, there is no adding one grain more than is already formed in the ear; though in all these cases, an addition or improvement may be made by culture, if applied at the proper time. It is, therefore, of importance for us to know the periods of growth of the different parts of the plant; and that if we happen to miss assisting it at one time, we may improve it at another. If the season is lost to increase the number of tillers, we may enlarge the ears; or if that is also omitted, we may increase the number of grains in the ears, and make them larger and fuller of flour. Hence, adds he, appears the great defect of the common husbandry, and points out the advantages of the top-dressing wheat in the spring with *soot*, *peat-ashes*, *wood-ashes*, or any other light manure, which bring the plants a fresh supply of nourishment

efficient when they want it most; and horse-hoeing, when that can be performed at the proper time, has the same effect of producing large ears; and for filling them the horse-hoe is the most effectual, as that can be performed at the critical time, and when the plants are large."

Thus far this gentleman illustrates, agrees, and confirms the doctrine of Mr. Tull, but differs in what follows.

"It has, says he, been commonly supposed by those who practice the new husbandry, that the most important hoeing for the purpose of filling the ears with good grain, is soon after the wheat has blossomed; but this, I believe, is a mistake, and that it should be performed immediately before the wheat blows; for before that is over, the grain is considerably advanced. His reasons for his belief are solid, because upon examination at the blossoming season many more grains may be observed than are ever brought to perfection; and, because any check at this critical time seems to have the same effect, as it has upon corn or other seed, after it has begun to vegetate; if that vegetation is put a stop to, it never recovers." Though I acquiesce entirely with this gentleman's reasoning, yet I cannot help expressing my doubts of the practicability of it at the critical time; for, if it should happen with others, as it hath with me, that the wind and rains had so bent the stalks and loosened the roots in the rows, that I was deterred from introducing the hoe-plough into my wheat at that time, this observation may prove ineffectual. Indeed, I am apt to believe from the silence of Mr. Tull, as to this circumstance, that the accident must have been peculiar to my wheat, as in the thirteen years practice of that great master, he never seems to have met with the like impediment. The fact, however, is certain, and therefore

fore the improvement here proposed of hoeing before blossoming, according to E. S. should never be neglected, for the chance of hoeing immediately after according to Mr. Tull, even though that were confessedly the better practice.

And now, after all, though the casualties I have met with, have rendered me cautious of recommending this husbandry to the general practice, in preference to the old husbandry, yet I cannot be excused, were I to conceal the real advantages that attend it, and they are so well described by Mr. Tull, that I shall give them in his own words.

“First, says he, we can augment our crops by increasing the number of stalks from one, two, or three, to thirty or forty in ordinary field land.”

“Secondly, by bringing those stalks into ear. For, if it be diligently observed, not half the stalks of wheat sown in the ordinary way come into ear.”

“Thirdly, by enlarging the size, and multiplying and filling the grains in the ears.”

“Thus, adds he, by encreasing the number of stalks, bringing more of them up into ear, making the ears larger, and the grain plumper and fuller of flour, the horse-hoeing method makes a greater crop from a tenth part of the plants than the sowing method can.” Another advantage attending the new husbandry, and in my opinion a very considerable one, is, that in wet summers, if any of the ears are blighted, they stand erect, while the sound ears bend almost down to the ground, so that a man may walk between the rows, and clip off every blighted ear without leaving one to affect the crop.

As a very natural conclusion to this account of the culture of wheat in the new husbandry, I shall produce some late experiments, because manifestly derived

rived from, and dependent upon the true Tullian principles. The first is authenticated by the relation of Dr. Watson, who has reported an experiment made by Mr. Charles Miller, son to Philip Miller, Esq; the celebrated botanist, by which it appears, "That having in the autumn of 1765 planted a single grain of wheat in the botanic garden at Cambridge; in the spring of 1766 he divided the several plants that tillered from that grain, and transplanted them into fresh earth, by which near 2000 ears were produced from the first single grain. On the second of June 1766, in order to repeat the experiment, he sowed some grains of the common red wheat, and on the 8th of August he selected a single grain which had produced 18 plants; each of these plants were planted out separately; and several of them having pushed out side shoots, those likewise were divided, and again transplanted; the whole number thus transplanted before the middle of October amounted to 67 plants; these remained through the winter vigorous, and in the spring of 1767 were again divided and transplanted, and from the middle of March to the 12th of April, 500 plants in all were produced, which were suffered to grow without any further division, and when ripe were gathered, and the number of ears thus produced from one grain was 21,109; some of the plants producing 100 ears from a single root, and some of the ears seven inches long.

Another experiment, which promises more utility, is reported in the Gentleman's Magazine for September 1769, and is as follows: many years ago Thomas Everard, Esq; of Southampton, having observed the prodigious increase of one grain of wheat in his garden, which he attributed to the fertilization of some accidental compost, was induced to try the effect of a composition of his own invention by way of *steep*, and was so gratified by the effect, that he

he communicated his discovery first to the gentlemen in his own neighbourhood, then to the Royal Society, and at length to the public. The liquor was made in this manner: I took, says he, a convenient quantity of rain water, in which I dissolved *Ass-tine*, about two pounds to a gallon; I let it stand two or three days, stirring it thrice a day. I poured the water off into another vessel, and to every gallon of lime-water, I put about four ounces of common nitre, and a pound of pidgeon's dung, mixing them well together, and stirring them three or four times a day for the space of four days, and then strained off the liquor to keep for use; and the use I made of it was this. I took an handful of wheat and put it into a quart of this liquor to steep, and when it had lain about 18 hours, I took the wheat out and laid it to dry in the air for the space of one day; then steeped it in the liquor a second time about 12 hours, and having laid it to dry as before, I steeped it a third time about six hours, and then set it in my garden, which was but common earth. I set it in single grains about ten inches a-part, and a finger deep. I do not remember whether every grain came up or not, though I think few failed; but from those which did come up, an increase beyond expectation was produced; from several grains 60, 70, and from one 80 stalks, with very large ears full of large corn; many of the ears being six inches long; had above 60 grains, and none less than 40."

This is a faithful transcript of Mr. Everard's account of this experiment. The root with 80 stalks he caused to be presented to the Royal Society, and it was long kept in their repository:

The thick matter that remained, he mixed with four times the quantity of common earth, and laid it up in the shade the whole winter, turning it now and then to incorporate the mixture with the mold; and

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at the time for planting pease, he caused spade holes to be dug, about six inches a-part, and in every spade hole he put a small quantity of the mixture, in which a garden pea was set, and covered with the common mold. The result was, that the pease grew to an uncommon height, not less than nine feet, were furnished with pods of an uncommon size, and supplied his table with green pease the greatest part of the season.

In the prosecution of this experiment, I cannot help giving this caution. That as it appears both from Mr. Miller's experiments, and from the experiment above related, that the grains of wheat must have room to extend their increase, care should be taken in the sowing, that the seeds may be spread as equally as possible, but not too thick. Upon moderately good land, half the quantity of seed thus prepared, may suffice, to what in the ordinary way is commonly sown. I know how hard it will be to persuade the husbandman to practise this frugality; he may, however, safely try a few lands at first, and as he finds the effect, let him continue, or discontinue the practice for the future.

An experiment of a later date than any above related, shall conclude this article of the culture of wheat, according to the new or Tullian husbandry.

“ Mr. William Penny, an Inn-keeper at Bengfworth in Worcester-shire, upon a loamy soil, set a peck of wheat on the third of an acre, in rows, nine inches asunder, and six inches from grain to grain; the land had been well fallowed; the crop was neither hand-hoed, nor hand-weeded; produce 34 pecks; but there being a path a-cross the field, a fifth was wasted, Total 40 pecks, or at the rate of 30 bushels an acre.” Tho’ this appears to fall amazingly short of the above experiments, yet it shews what I have all along endeavoured to enforce, that not the quantity of seed that is sown, but the goodness of it, and the

the richness of the land that the seed is sown upon, is what farmers are to depend on for their crops. In this experiment the seed saved, more than paid for the expence of planting, which is rated at three shillings. [See Six Months Tour. Vol. iii. p. 397.]

I come now to the culture of wheat in the common husbandry, which, is so well understood in the southern counties of Great Britain; that it were impertinent to speak of it, were it not to extend the practice as much farther as the circulation of these sheets may happen to reach.

In preparing the land for this grain, the best farmers do not all practise the same method, nor do the same farmers always prepare their land the same way. The most general method, and perhaps the most certain for a crop, especially in indifferent soils, is to make a clean summer's fallow, plowing as often as the season will permit, raking, burning, and destroying the weeds as much as possible, breaking the stubborn clods, and pulverizing the earth, till it will harrow fine; when that is accomplished, they lay on manure, about twelve loads to the acre, (reckoning about a ton and a half to the load,) plow it in, and leave it to ferment till the season for sowing, and when that arrives, they perform the last plowing, be it sooner or later, from the beginning of September to the middle or even the latter end of November, as the weather and the farmer's conveniency happen to coincide.

It has indeed been observed, and I believe justly, that there is a particular season in which every annual plant should come to its height to produce its seed in the greatest perfection. If the seed is sown before the time requisite for this purpose, the plant usually grows larger. If the seed is not sown till after this time, the plant is smaller. 'Tis the general opinion that the proper season for wheat is from the end of September,

tember and middle of November. Dickson's treatise of agriculture, v. II. p. 71.

In their plowings for a fallow, they differ much in different counties; and it may be truly said, that, if in that operation, one farmer excels another, or the practice of one county is preferable to that of another county, the superiority must have been the effect of chance; for I never had the pleasure of conversing with one practical farmer yet that perfectly understood the principles upon which he proceeded.

If it be true, as Mr. Tull has endeavoured to demonstrate, that the earth receives its vegetable food from the air, it will follow, that the more of that earth that is exposed to the immediate action of the air, the greater the quantity of vegetable food it will attract; this naturally leads the intelligent cultivator to the practice of plowing as deep as the staple will allow; and to enlarge as much as possible the surface of his land, by cutting it into narrow slips, laying it into high ridges, and deepening the furrows.

But it has been observed, and universally allowed, that land in a wet condition, loses much of its power of attraction, and that while it remains in such a state, it is so far from receiving benefit from the influences of the air, that it is greatly hurt by it. This again as naturally leads to the practice of two methods of plowing; one for the winter, the other for the summer. And, indeed, were it not for the manifest effects that frost has upon all lands, particularly upon clay-lands, winter's plowing, upon this principle, might totally be exploded. Mr. Tull asserts, that land plowed wet in November, will be harder in the spring, than land plowed dry in August, and hardness, according to the Tullian theory, is the same as barrenness.

It is, however, a prevailing practice in the midland counties, to *bout* or *two-bout* their stiff-lands in the winter, that is, to lay them in single or double

ridges, by which the earth has all the advantages of the winds and frost, and at the same time the wet, if immoderate rains fall, has a channel open for it to run off. In light land they plow up the *thoroughs*, that is, they change the **BROAD LANDS**, by filling up the old furrow, and making a new one in the middle of the **OLD LANDS**; this, they say, they do to prevent the mould from being washed away.

In Kent, where the turn-ridge plow is chiefly in use, they hardly know what a ridge is; they plow their grounds upon the level, but at the same time they plow their fallows so deep and hollow, that when rain comes, it sinks below the surface, and they see no more of it. Their round chissel-pointed share is particularly adapted to that purpose.

In Essex, they plow their fallows into five-furrow **LANDS**, and then make a deep furrow, or trench, as in the horse-hoing husbandry, to divide them.

In all these places, and I believe all over the kingdom, they plow their fallows early in the spring into broader lands; and afterwards cross-plow them. I do not mean without exception; for in the Vale of Evesham, and I doubt not in other places, a great deal of land is always plowed one way, and in ridges resembling the roof of a house.

In fallowing they split their *acre and half-acre lands*, but always ridges them up when they sow. In that situation it is easy to conceive they mean to lay them dry. And indeed in all the winter plowings this seems to be their aim: they know by experience, that wet hurts earth, and that frost mellows it; but they know not that increasing its surface increases its fertility. In all their plowings for a fallow, they chuse to plow dry, when the ground is in a condition to admit of it. But it frequently happens in summer, that in stiff clays, the little farmers are obliged to watch for rain, because the clods are so hard that
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the plow will make no impression. In that case, the great farmer's endeavour, where they have strength enough to perform it, to overcome the stubbornness of the soil by means large heavy harrows, which from their weight and unweildiness have acquired the name of ox-harrows. To these harrows six, eight, and sometimes more horses are harnessed, by the tramping of whose feet the clods are bruised so as to admit the tines of the harrow, which otherwise would have dragged them forwards or turned them on one side. In this respect, as in almost every other, the great farmer has the advantage of the little farmer. It is however of the utmost consequence to bruise, break, and dissolve the continuity of hard baked earth in the summer, because by so doing, the weeds are more effectually eradicated, and the soil, being more exposed to the action of the atmosphere, contracts a greater degree of fertility than is otherwise possible for it to do when shut up in large solid lumps. Upon the perfect performance of this operation, the great advantage of summer fallowing depends; for the earth receives little or no enrichment from the air, while it remains in a state of solidity, as every farmer's experience must have informed him. To facilitate this operation, therefore, many instruments have been contrived, among which, Mr. Randal's spikey roller is one of the most effectual. Mr. Young in his experiments, has carried summer-plowing for this purpose to excess. No corn can repay the common farmer, if he must plow 12 or 13 times to raise it.

The land, however, being more or less prepared, as the nature of it and other circumstances will admit, the farmer's next great care is, to prepare his seed, and in this article some are very curious, even to picking the grains on a table as good housewives do rice; but this nicety I think too minute. To

change the seed often, to procure it clean, and to wet it in brine, and then lime and then sow it, I account a very good practice,

In this operation, I need not tell the frugal farmer that the light grains that swim a-top of the brine are to be skimmed off for his hogs; though, by the way, were it not for that advantage, the trouble might be spared, as few of those grains would vegetate, and none of them would do harm to his crop; indeed a late experiment reported by Mr. Young in his North Tour tends to contradict this. He says, that Mr. Penny of Benjsworth, has sown the smutty corn skimmed off in brining, and it has produced good sound wheat; though this may have happened, it is not a practice much to be relied upon, as Mr. Penny himself, in his ordinary practice, explodes it. But what the best farmers are most cautious about, is, the seeds of weeds; and some are curious about the thinness and brightness of the wheat they sow; for which reason, as well as for change, they sometimes fetch their seed from a great distance.

Dr. Home found by experiment that impregnating the seed with a steep of hen's dung and nitre, increased the fertility of it; and he recommends the practice, because, says he, by so doing we fill the seeds with plenty of rich nutritious juices, which give them vigour to send forth many roots, upon which the nourishment of plants depends. Those who approve of steeps, cannot, perhaps, contrive a better than that prepared by Mr. Everard, as above recited. But I must own, from the experiments I have tried, I have no faith in these preparations. I believe they seldom do harm; but the success of the crop depends on the innate goodness of the seed, and upon the fertility of the land on which it is sown, and not on the virtue of steeps, let them be ever so nicely prepared.

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There are some who have observed, that seed sown dry, without preparation, succeeds upon certain occasions much better than seeds prepared. Upon light dry land, if the seed is sown early, and a series of dry weather ensues, that which is unprepared will be long in the ground without vegetating, and when rains fall will vegetate vigorously; but seed prepared, being thus sown, will vegetate too precipitately, and the rising spears, having little or no moisture to supply their infant state, they languish, and having then received a check, never again recover.

In whatever manner, however, the seed is prepared, it is the usual way to sow it upon the fresh silt when the land is yet moist, or but moderately wet; but the quantity sowed is various in various places, and even in the same parish: from two bushels (nine gallon measure) to three bushels upon an acre, and I am told, in some of the western counties, more.

I hope, however, after the publication of this little treatise, in which the inexpediency of this superfluous quantity of seed will appear, that no farmer will persist in wasting so much bread-corn, without proving by experiment the necessity of it. And this I would have every farmer to do, by selecting one acre, on which to sow but two bushels, where his general practice has been to sow three; and to convince himself by attending to the produce, not by appearance, for that may deceive him, but by actual measurement, and by comparing the produce of that acre with the average produce of the rest of his crop. If a bushel upon an acre may be saved, as in some cases it certainly may, an hundred bushels upon a farm where an hundred acres of wheat are annually sown, are surely a quantity worth the farmer's attention at any time; but more particularly when bread-corn is scarce.

Upon poor land, it is said, that if seed was to be spared there would be no crop; to this I answer, that upon poor land there seldom is a very great crop; and what such land produces is generally hungry, thin, half-eared wheat, from that very cause of being over-keeled. In ordinary matters that are more obvious to our senses; no man would put a greater number of cattle into a poor field than into a rich one, with the hope of making them fat. And yet, with no better reason, they throw a greater quantity of seed into poor land than into rich, with a view to increase their crop. This surely, is an absurdity of the first magnitude.

Be the quantity, however, more or less that is sown, it is always harrowed till it is well covered, and when that is done, water-furrows are generally struck in various directions, according to the situation of the lands, in order to carry off the superfluous wet during the winter, than which superfluous wet there can be nothing more injurious to wheat. These water-furrows should not be trusted merely to the plough. The main drains should be widened and deepened with the spade, especially in clay-lands, to the bottom of the staple, for there it is the water stagnates. An industrious man will do 100 yards of this a-day, if the land be in order; and one of these open drains, if properly directed, will be of more service than two or three covered ones.

Where there is a gradual descent, suppose upon the side of a hill, or any long continued declivity, the method is to mark where the ground is most apt to poach, and full a-cross that spot, from one side of the field to the other, draw your drain; if the descent varies, the line of your drain must vary accordingly; a common swing-plough, where there is no trenching-plough, drawn to and fro, will prepare it for the spade, and when the mold is thrown out,
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all that is fine may be dispersed upon the land, and what remains thrown to the under-side; the mouths of the furrows of the upper-side being all neatly opened. Parallel to this drain, both above and below, at twenty or thirty yards distance, other drains should be opened and cleared as above directed, and from the uppermost of these drains to the lowermost, channels of communication should be made, so that the drains may never be suffered to be overflowed by the heaviest rains. By means of such trenches as these, and narrow lands or ridges, the tender plants of wheat may be preserved in the common husbandry through the severest winters.

In the vales of Evesham, and Aylesbury, and in other fertile counties, they make their lands broad, and ridge them up sharp; and by continually plowing one way, as has been noticed, they gather up the earth in such a manner, that no wet can lodge to hurt the wheat in the winter. Balks, however, are frequent between their lands; but these, I am told, are usual in other counties, where property is parcelled out in yard and half-yard lands, and a severe penalty imposed upon those who plow so much as an edging from the balk. In all the vales throughout the kingdom, where large deve-cotes are frequent, they sow pidgeons dung with their wheat, about six or seven bushels to an acre, which is an excellent manure for raw cold land.

In the Rodings of Essex, and in the hundreds where the earth is rich but spewy, after thoroughly plowing and pulverizing, they sow upon the fleet or flat, and with a double mold-boarded plough gather whole fields into single sharp ridges; by which contrivance, though their fields lie upon the level, the rain seldom hurts the wheat. These ploughs strike a deep furrow, and leave a wide trench. This is tantamount to Mr. Randal's Semi-virgilian husbandry, which

which answers extremely well in these kinds of soils, but is a waste of ground in dry light soils, nothing hardly growing in the furrows.

Another method practised for laying the tender wheat dry in the winter, is, by laying it in three about ridges with a deep board furrow between each; all these ways are found to answer in particular soils, or they would not be continued by husbandmen, who are to get their bread by their little bargains, and whose heads are ever at work to make both ends meet. Incredible pains are taken by them to lay their wheat dry.

Land ditching is a new improvement very much practised in Essex and Hertfordshire, and is now beginning to be extended to other counties; but I can not recommend the practice in clayey soils. My reason for it is this, that clay being naturally formed to resist water, or to admit it to pass but slowly thro' its pores, when it is cut into trenches, they can carry no superfluous water off, but what sinks into them from the surface, or drains into them from between the upper mold and the bed of clay. When the trench, or what is called the land-ditch, is properly bottomed either with loose, round, or rough stones, which are the best, or with bavons, broom, heath, or straw, or any other porous material; the earth is again filled in and levelled, and in a year or two admits no more water from the surface in the drains than any other part of the field; the drain between the mold and the clay closes and becomes useless, and in two or three years very little water is seen to pass through those drains, unless they are fed at their heads by cross-ditches, or other runs of water that help to keep them open; whereas in ground that is porous to the full depth of the land-ditch, the water keeps continually soaking into it from every part, by which it is perpetually fed, while any superfluous moisture remains to be carried off. Who-

Whoever, therefore, attempts to drain clay by covered ditches will lose his labour, unless he has better fortune than the writer of this treatise, who having land-ditcht about six acres of clay, with every advantage of situation, was forced to have recourse to open drains to keep his ground dry. To do this, however, is an essential article, without which no considerable advantage can be expected from the very best culture.

I must not conclude this article, without taking notice of a very common method practised in Oxfordshire, of sowing one cast upon the level before ploughing, and another on the rough tilth, and harrowed in after ploughing; giving this as a reason, that if by any accident the one should miscarry, the other most probably will succeed; so that according to their notion, the certainty of a crop is insured at the expence of a two-fold manner of sowing their seed. I know how vain it is to combat rooted prejudices, by arguments; and therefore I shall only remark, that if in other counties their crops are as certain, without that precaution used as in Oxfordshire with it, this two-fold manner of seeding is needless. Indeed, it is a tacit confession, that half the seed that is generally sown, if it takes, is sufficient to ensure a crop; so that half the seed may be spared in kindly years, according to the practice of those farmers, without any danger of a disappointment.

Another very singular practice I have seen in some parts of that county; and that is, staking horses upon young wheat, in the spring; and I have been told, that it is not uncommon to let swine feed amongst it at that season: That sheep and lambs are suffered to eat the tender blades of wheat, in order to press the earth close with their feet to the roots, after being loosened by the winter frosts, on light lands, seems to be a practice warranted by reason;
but

but the most voracious swine should be
detained in separate pens, and destroy the
wheat as well as bar them up with their teeth,
as advantage must have been discovered by
experience, that such swine could have been re-
trained, and anything that could have been urged
in their favour. Feeding with sheep in the
winter, and with cattle when wheat is rank,
and in the spring of the fall and spring, or by being
cut down, and a mild winter succeeding; but then
not to be fed off when the ground is dry, and be-
fore the wheat is well matured: otherwise much of
the advantage will be lost.

There are many other ways of preparing land for
violation, rather than what I have here recited as the
first method.

With their farm and, of no mean account for knowledge in their profession, after summer-fallowing and dunging, make it their rule to sow turneps, and then to sow them off with sheep, or neat cattle in the winter. In the spring for oats or barley, or wheat. In a few weeks after, they harrow in clover, and so that means procure, as it were, a double crop of any kind. For the clover, the succeeding year, will save the trouble of mowing, trenching, and dunging, and generally when sowed after turneps pays better than any ordinary crop.

By this management they think their fallow is recovered, for in four years they gain first, a fallow and a crop of turneps; secondly, a crop of oats and barley; and thirdly, a double cut of clover, or, what they account better when they intend to sow wheat, one early cut, and summer's feed for their cattle, which helps to enrich the land for their succeeding crop of, fourthly, wheat which they sow the same year upon a fallow earthing on the clover ley, when the ground is moist, and fed down bare.

The

The crop of wheat that succeeds a clover ley, if the ground is in good heart, is esteemed by many the finest and purest that grows. It is generally clean, as the clover, when it succeeds abundantly, chokes the weeds, and will not suffer them to grow; and being turned down moist, it heats and ferments in the winter, and by that fermentation, not only nourishes the plants with a kindly warmth, but dissolves the seeds of the weeds in the common mass of corruption, into which all the branches and roots of the clover, are in process of time converted.

I own, that this method of preparing for wheat, pleases me the best, and I always practice it, except when I am prevented by the fly, to which my land is but too subject; so that I am often disappointed of a crop of clover, after I have taken the pains to prepare for it, but of this in its proper place.

When I sow wheat on a clover ley, my method is, to give it a sprinkling of lime, about fifteen bushels to an acre, which I think preserves the grain from grubs, and warms the cold earth about the vegetating wheat, till the effect of the internal vegetable fermentation begins to take place. And in the spring, when the effect of that fermentation has ceased, I then add a sprinkling of foot, about the same quantity as I did before of lime, which I persuade myself more than doubles the expence, as I can perceive the effect of it, both in checking the weeds, and in nourishing the plants at this particular period; but whether it continues its virtue to the period of ripening, *that*, I will not take upon me to affirm; for tho' I can perceive plainly where it is sown while the wheat continues green, yet I never have been able to discover any difference, either in the apparent bulk of the stalks, or in the size of the ears, or plumpness of the grain, when ripe, in those lands that have been footed, from those that have been missed, tho' I have very carefully

carefully inspected them for that purpose; indeed I have never entered so minutely into the comparison as to be able to determine precisely as to the produce; yet as it is manifest, that the foot enlivens the plants at a certain period, which is visible to demonstration, by their change and colour from a pale to a deep green, I am encouraged to continue the practice myself, but recommend it with caution to others. It is a maxim with me, that every unnecessary expence in the culture of land is a waste of substance; and in a large concern, a little wasted upon an acre, becomes considerable when added through the course of an extensive crop. Ten shillings upon an acre, becomes 50*l.* when multiplied to an hundred acres, and 50*l.* a year laid by in clear profit, is nearly as much as a farmer can annually accomplish who rents 200*l.* a year. Some, as soon as they sow their wheat upon a clover ley, fold sheep upon it; others lay on stable dung, spread it, and let it lie rough all the winter; but these methods do not suit every soil, nor are they always practicable. Ellis commends stone-lime, 40 or 50 bushels to an acre, but against that infamous practice I have said enough.

But to return; another way of preparing for wheat is, by sowing oats alone immediately after fallowing and dunging; and after the oats are mowed, plowing in the stubble, suffering it to heat, and the shattered oats to vegetate, and then plowing for wheat. The reason given for this practice is, that in rich land the dung and dung are apt to produce such a rankness of weeds, as cannot be conquered without injuring the wheat; and moreover, that the wheat itself is so weak and tender at first, that it spends itself in growing, and afterwards wants strength to fill the ears; and if the ears do fill, they become so heavy, that they bear down the stalks, and the crop is lost, or will grow through and entangle the lodging,

ment, and the wheat is thereby so much damaged, that it does not answer the expence.

But tho' part or all of this may have happened, yet I cannot approve of this practice; for where the land is so rich, there does not seem the least necessity for fallowing, especially as there are other ways of conquering weeds besides fallowing. A crop of French wheat, winter vetches, drilled pease, turneps, &c. will cleanse and correct the luxuriancy of rich land without a fallow. And if the land is not rich, these will take off the rankness of the first dunging, and at the same time add fertility in its room.

However, I do not in this treatise pretend to force any man out of his own way; all I aim at, is, to bring together at one view, the best methods of culture that are practised, and to leave to every man's choice which to prefer. For my own part, I am not so great a bigot to any system as wholly to disapprove of every other, or to imagine that good crops are always the lot of the best husbandmen. What succeeds with one, oftens fails with another; and the same success does not always attend the same husbandry. Much more depends upon latent causes, which we are apt to resolve into chance, than is commonly understood, and a coincidence of lucky circumstances often gives the greatest sowing the greatest increase. It is in vain, therefore, to decry this or that practice, for as the peculiarities of soils, minutely considered, may be infinite, so the ways of managing them may be infinite also.

One peculiar method of preparing land for wheat, is, by paring the surface about an inch, or an inch and a half deep, burning it, and spreading the ashes as equally as may be over the naked space, then sowing turneps. In some places they plow immediately for wheat; but the former practice is more rational; they first plow shallow for turneps, then a little deeper
as

as soon as the turneps are fed off; and gaining by little and little, at three or four plowings a tolerable tilth, they then sow wheat, three bushels at least upon an acre.

It is observable however, that land managed in this manner, does not last, but every fourth year must be suffered to run to swart, that after a series of years, it may again renew its fertility, and again be burnt for another crop; and down lands in Devonshire, the newly broken up lands in Gloucestershire and Worcestershire, the cold fenlands in Lincolnshire, and the boggy lands in Ireland, I am told, are managed in this manner.

In these situations, the practice is common, and the labour cheap, not exceeding sixteen or eighteen shillings an acre for paring, burning, and spreading. Were the same practice to be introduced in the neighbourhood of London, the bare paring of an acre, were we to calculate at the common rate for cutting down, would amount to 7*l.* nearly, a price which seems at first sight out of all proportion; yet I do verily believe, that in some rich soils, much infested with rank weeds, it might be worth the occupier's while to bestow that money to extirpate them effectually. It is that practice would accomplish their design. On a rich deep soil, paring and burning can do no harm; on a poor thin soil, these operations must have a tendency to make them thinner and poorer.

It will be said, that this is mere conjecture, that I have no proof of the fact, and that therefore the above is no *solid* foundation whereon to produce or receive no real benefit from my instruction. To this I must answer, I've once for all to these objections, that no conjecture is offered in this treatise, but what is derived from practice somewhere. That it is a practice now burnt in some counties cannot be denied,

seed, and I have seen corn between Popham Lane and Winchester growing upon land so managed, among which there did not appear a weed. It is upon this fact, that I form my conjecture, and that a certain effect which attends a certain method of practice in one county, will probably attend the like practice when transferred to another county; but I cannot absolutely assert that it will. Every conjecture that may be found in this treatise shall have an equal degree of probability for its support.

Another way of preparing for wheat is indeed local, but must not here be omitted; it is practised in the neighbourhood of Guildford in Surry, where it is no unusual thing for the farmers to sett their light sandy lands to their labourers and others by the perch, rood, or acre, for the purpose of sowing carrots. With these labourers they make it a condition to trench the land so sett them, two spade deep before they sow their crop, and to hoe it thrice while the carrots are growing, to leave the land clean, and to remove their crops from the premises before the wheat season approaches, that the farmers may have time to plow in their dung. This is an advantageous method of preparation, which is not every where to be obtained. This land the farmer setts for about three pence a-perch or forty shillings an acre, but the culture it is, by which he makes his greatest advantage.

About Stratford, something I am told of the like kind prevails with respect to the potatoe culture; but the Irish labourers give at the rate of 4l. an acre rent, and subject themselves to the like condition of clearing the ground before seed time, and I have of late been credibly informed, that potatoe ground is still sett dearer in Lancashire than even at Stratford; and that poor men there give at the rate of 12l. an acre, and subject themselves to the like conditions of leaving the land clean at a certain day. But the same person
assured

if there has been any more introduced : species of disease of seed which grows, that in the first year the grain is much better, and that the first crop is much better than the second, and the latter nine.

I am willing to believe, that the mow which is made in the autumn, and is left to rot, is of particular use in certain seasons, and in certain soils. About Stratford, in the county of Oxford, wheat upon an acre of good soil, and in good quarters, will not grow so well as in the quarters of an acre of poor soil, and where the soil is not so rich. The mow which is made in the quarters of wheat, and is left to rot, is of great use in the quarters of wheat, and is of great use in the quarters of wheat, and is of great use in the quarters of wheat.

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Indeed

Indeed they fallow and lime for wheat, and as no one ventures a crop upon fallow alone, all the merit of the increase is placed to the account of the lime; whereas, if Dr. Home's experiments may be relied upon to prove any thing, they prove just the contrary.

Four years ago upon a hilly-field of clay, I limed for wheat at the rate of sixty bushels upon an acre; and by the persuasions of my seedsmen, I sowed near three bushels of wheat and reaped after the rate of sixteen. The year following, oats were sowed upon the same field, not thro' choice, but from necessity, and produced about four quarters upon an acre. The third year, barley and clover, after being winter fallowed and ploughed thrice; the barley did not amount to five bushels upon an acre, and hardly a blade of clover was to be seen when the barley was mowed, tho' sowed at two different periods, both favourable enough, as being sowed when the ground was moist, and rain succeeded in a few days after sowing.

The absolute sterility of this field I wholly impute to the effects of the lime, which, tho' as a manure I decry, yet as a preservative against the ravages of grubs and insects I most zealously recommend. Neither is there any bad effects to be apprehended from the moderate use of it, ten or fifteen bushels sown upon an acre by hand, in such a manner, as to be all equally diffused, will warm and cherish land, when sixty spread with a shovel will hurt and impoverish it. This caution I thought proper to repeat, because of the indiscriminate use which the best farmers are too apt to make of this manure.

Farmers upon the hills have yet another method of preparing for wheat, and that is, by feeding off, and folding their St. Foin, one or two years before they break up the leys, and then ploughing early in the spring, ploughing again about the beginning of June, and before the end of August they are sure to have their

seed in the ground. As their soil is generally of the light or chalky kind, they use but very little manure except the fold, and, in the room of dressing, bestow an astonishing quantity of seed, some fourteen pecks and others four bushel, what their return may be I have not been able to ascertain, but their crops being generally clean, they sell their wheat at a great price to low country farmers, who are very fond of it for seed, as it is small and bright, and generally runs very even. Being small more grains go to the bushel, and its brightness is another recommendation, as its colour continues for two or three years, after being sowed in coarser soils.

The farmers in the Isle of Thanet have a method of preparing their land peculiar to themselves; instead of clover they propagate chiefly trefoil for the sake of feeding their sheep, and because it is more lasting than clover. After reaping the full benefit of four years crops, they feed it off bare, and about the beginning of November, dung, plough, and sow their wheat upon one earthing. They brine their seed with sea water, sometimes roll, and sometimes drive their sheep over it to settle the earth about the seeds, and tread in the dung that would otherwise remain upon the surface. If the wheat is rank in the spring they feed it off with their sheep; if not, they suffer it to remain and ripen, and sometimes cut it with the scythe.

Different from all these ways, and as a medium between the new and old husbandry, I have seen a method proposed, which I think I may be allowed to approve, tho' I do not recommend it as a practice generally to be adopted, and that is, after fallowing in the usual manner, dividing inclosures into twelve feet LANDS, and sowing alternately every other LAND. This method is liable to none of the objections which have hitherto retarded the progress of the new husbandry

bandry ; and yet it seems to promise all the advantages of it:

It is managed with the same instruments that the common husbandry servants have been accustomed to ; it is ploughed and sowed in the same way or nearly so, and it may be hand-hoed if the weeds become rank. Instead of sowing only four inches in seventy-two, one inch in two is sown ; and as to the vacant LAND, it may be ploughed, or if you please, horse-hoed as often as the weather and time will permit ; in short, it will receive a whole year's fallow to prepare it for a future crop, and if a sprinkling of dung can be spared for it, the increase will no doubt answer the expence.

Among the superior advantages attending this method may be reckoned one, that the furrows which occupy no inconsiderable space in the old husbandry, and produce but little, will in this husbandry be wholly occupied, or, more properly speaking, there will be no vacant furrows ; and the edges or outsidcs by means of the frequent ploughings of the vacant LANDS, instead of being poor and weak, will be the plumpest and fullest corn in the whole LAND. Add to this, that the air having a freer current thro' the young wheat will contribute to its nourishment in a double proportion to what it usually does in the old husbandry.

That this method will be profitable where dung is scarce cannot be doubted, for it is now universally acknowledged, that tho' tillage has not all the properties of dung, and therefore cannot wholly supply the want of it, yet, where it is properly performed, it does much more towards fertilization than dung of itself can without proper tillage. And we may safely conclude from Mr. Tull's experience, that the longer any field is cultivated in this manner, the richer and more fertile it will grow.

The notion seems to be this, that between the soil and vegetables of every kind there is a mutual attraction of particles; the vegetable is continually sending forth something into the air or atmosphere, and is often receiving something back; that which it sends forth is robbed of all its nutritious particles, and that which it receives abounds with such; it is therefore reasonable to suppose that even weeds in this sense may be made to supply the place of dung, nay, that they may be converted into an actual dressing; for by ploughing them up and returning them back into the earth from whence they arise, they suddenly heat and ferment, and by that fermentation a total dissolution of their particles, and consequently a corruption of the whole mass. As often therefore as a quantity of rank growing weeds are ploughed into the earth, so often you may be said to give it a fresh dressing; and hence it is, that lands that are thus alternately fallowed and sowed, become richer by that method of culture.

I have now a field of eight acres preparing after this method. It is a clover ley, which I intend to continue for winter's feed. In the spring I propose to break up every other land, and in the summer to let the sheep and cattle graze upon it indiscriminately; but to all intents and purposes to give my broken up LANDS all the advantages of a summer's fallow, and when the season comes I will give the latter parting a small sprinkling of dung, and then sow wheat. After which I will shut up the whole field, and suffer no more cattle to enter it, till I have given the experiment its full effect.

I know it will be said by others, because my ploughman has already said it, What can you think to get by ploughing half your lands? does it not double the rent? True, but it lessens the labour and expences. Seed and time of ploughing and sowing are saved.

But

But he adds, you do not intend to ~~save~~ ploughing, for instead of three times ploughing for wheat, ~~if~~ you plow as often as the weeds spring up, you ~~must~~ plow once a month. Admitted that in summer I may. This then will be six times ploughing one half, which will be equal to three times ploughing the whole; but this will be the greatest part of my expence.

Dung, where my farm is situated, costs five shillings a-load, besides fetching two miles; three shillings a-load, and to fetch it six miles; one shilling and six-pence a-load, and to fetch it thirteen miles. Dunging an acre at fifteen loads to the acre, cannot, therefore, be estimated at less than four guineas at an average, one half of which may certainly be saved.

As to the produce it may be estimated upon good authority, at three-quarters upon the acre. This I report upon the credit of the gentleman that first devised this new method; and I am the rather inclined to believe the fact, from this consideration, that in most inclosures in the common method of husbandry, the furrows and water furrows take up a considerable space, and produce little or nothing. In this method the furrows are made deep, as in the new husbandry, upon the edges of the intervals, and take nothing from the Lands that are sown; these furrows lie open all the winter, by which the superfluous wet is drained off from the wheat; and then, when the spring season returns, they are filled up with fresh earth from the interval, which gives vigour to the vegetating roots, and affords an easy passage for them to spread. This advantage with the additional tillage, it may be presumed, will balance the deficiency of ground, especially when it is considered, that Mr. Tull had often upon two rows in six feet Lands, at the rate of five-quarters of wheat on an acre.

It has been shown that it were offered fall, into the hands of men, to select to plant the best experiment, and to lead on them to more systematic regard to the soil, the climate, and husbandry. I am persuaded that the same, and the same success, are not to be expected, if the same soil, and the same climate, were to be offered to them, though cultivated alike, and in the same manner. Thus, I believe, every experiment, that man may devise, without being able to change the soil. Where wheat has flourished, it will flourish a continued year after year, without any change of season. I would advise the choice to be made of such soil, on which wheat has been observed to thrive best at the least expence. To this choice it is reasonable to conclude that wheat is not only the vegetable species of vegetable is found to be most, or to speak, perhaps, with more propriety, agreeable to the soil on which it is planted: it may, I believe, be continued annually without any fear of exhausting its proper food to the latest period of time.

I do not found my opinion merely upon Mr. Tull's Theory, nor upon the thirteen years experience which that gentleman has recorded in confirmation of his own hypothesis; but I ground it upon a more infallible guide, the uniform course of nature, that on certain soils has continued certain species of vegetables almost in exclusion to others from the beginning, and probably will continue the same to the end of time, if wholly left to her own disposition. To this observation it may, perhaps, be objected that wheat is not the natural production of any soil in this part of the world. True; but it thrives in some spots much better than in others, and wherever it is found to thrive best; there it is most likely to be propagated to the greatest advantage for a continuance.

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As the author of this discovery has invented a drill of the most simple construction, and also a method of drawing the rows, by only changing the tines of the common harrow, a more particular account of these instruments shall be subjoined to this work. In the mean time, I see no reason to doubt, but that spraining the seed thinly after the plough, and missing every other furrow, may answer all the purposes of a drill, by leaving room between the rows for the hand-hoe, which may be used or not used, as the soil may require.

It should not here be forgotten, that since the encouragement given to agriculture by the laudable Society of Arts, it has been discovered, that wheat sown in February, if the season be mild, will thrive abundantly, and produce a plentiful crop; so that should the autumn prove rainy or otherwise unfavourable for the sowing of wheat, the farmer needs not despair of a second opportunity if his land is kept in tilth for the reception of the seed.

Of late years the month of February, or at least the greatest part of it, has been remarkably mild; and when that happens to be the case, the earth is strongly inclined to vegetation, and exerts its force in the production of every kind of plant that is sown more vigorously, than in any other month in the year. If, therefore, wheat is sown as soon as the first indications of the spring are observed, and the subsequent weather happens to correspond with those early indications; then the farmer will be so far from being a sufferer by missing the first season, that, if the winter has been generally rainy, cold, raw, and foggy, he will probably be a considerable gainer. White Cone Wheat, Mr. Tull observes, will bear to be the latest sown.

It has been farther remarked, that early sown wheat is very apt to spend itself in straw, and nothing is
more

more deceitful than the appearance of such a crop; but the farmer has nothing of that kind to fear from late sown wheat, which, if it escapes the fatal effects of frosts, when the spears are tender and just beginning to break through the ground, will most assuredly overcome all other accidents till blooming-time, when, like all other wheat, it is liable to a second mis-carriage. There is nothing particular in the culture of late sown wheat, provided the land is in heart; but it will be labour lost to sow wheat in February upon poor land, or land not in a rich and mellow state.

It remains now, that I should say something of the reaping of wheat, and of the various ways in various countries of stacking and housing it. As to the reaping or rather cutting of wheat, there are two ways, one with the sickle, which is the most general in England; the other with the scythe, which is the most general in some foreign countries.

By the Rev Mr. Comber's account in the Museum Rusticum, the practice of mowing wheat is general in the wolds of Yorkshire; and that gentleman recommends the practice experimentally. The method is, says he, to employ two mowers, two gatherers and a binder; and these five hands, if I understand him right, will cut down, gather, bind, and stook four acres a-day, each acre producing between three and four quarters upon an average; now allowing each of the hands employ'd in this work half a crown a-day, which is great wages in that country, but dearly earned, as the labourers work early and late, the cutting of four acres amounts only to 12s. 6d. whereas cutting the same quantity with the sickle, in the neighbourhood of London, will cost at least 1l. 12s. including beer; this is a very considerable saving were there no inconveniences attending the practice; but Mr. Comber acknowledges,

ledges, that when the wheat is lodged, they chuse ~~even~~ in those wolds to reap it with the sickle. And when it is considered, that in the hurry of gathering and binding much wheat must be shattered and left behind, and many ears cut off by the scythe, as I have seen in mowing of oats, even where they have stood generally erect; I do not apprehend that all that is saved in cutting is clear gain. Add to this, that where weeds or quitch abound among wheat, mowing of it must be attended with many obvious inconveniencies, more than sufficient to balance the saving by cutting.

Let us, however, describe the manner of mowing, where that method is most in use, that farmers who may be inclined to practise it either by necessity from the want of hands, or for the quicker dispatch on account of threatening weather, may be at no loss to direct their servants in the performance.

Where the wheat is clean and slender, the mower instead of advancing with his feet upon the square, goes forward in a line, with his feet one before the other, by which he gains time. Where the wheat is weedy or heavy, he has not power sufficient in that posture to command his stroke; and, therefore, is obliged to proceed upon the square.

In mowing oats, the mower leaves the standing corn on his right; in mowing wheat, he leaves it upon the left, by which the swath is in a great measure supported by the standing corn, and the gatherer with a smooth blunt hook gathers it up readier and sooner for the binder, than if it lay flat upon the ridge.

The scythe with which they mow the wheat is different in different countries. The Brabant scythe rests on the inside of the shoulder, the Hainault on the lower joint of the arm, and on the thigh; the French scythe is the same with the cradle scythe in England,

England, only with a strait handle; the Yorkshires wold scythe, and the ordinary English scythe are the same.

It were needless to mention the method of cutting with the sickle, only just to hint, that in some countries they are more dexterous than in others. In Scotland, where they reap oats and barley with the sickle, the labourers are much more expert than in England; they cut closer to the ground, gather cleaner, and will reap more in a day than the reapers do here, owing to their being more early bred to it in that country than in this. It is no uncommon thing to see children of ten years of age reaping with a sickle in that country, and vying with women in their endeavours to excel. The reason, probably, that may incline the farmers in that country to reap rather than mow, is, that labour is cheap and corn dear; and, therefore, what they save from waste in the former method, more than pays the difference of expence.

It is certain, that in England, in years when oats and barley do not ripen kindly, that is, when one part of the corn in the same field ripens before the other part, and that before one part is fit to cut the other is ready to shed, the waste that is made by mowing is incredible; and, I believe, it may generally be observed in the very best years, that the quantity shed is more than the seed sown; for whenever a field is plowed up, either of oats or barley, immediately after being cleared of its former crop; the corn that springs up, after plowing, is equal to any spring crop whatever, and many people suffer self-sown oats, as they are called, to stand the winter, and find them exceed their spring crops, not in burden only, but in goodness, of which I myself have been a witness.

As to the manner of flocking or stooking, as it is called, all the contrivances that have come to my knowledge,

knowledge, have been liable to more objections than the common method. What the farmer has to do, is, to see that his reapers make their sheaves of a moderate size, and as nearly of a bigness as possible; and that the corn be laid even at the bottom, that when they stook them they may stand firm, and the ears rise gradually to a point; and also that the sheaves be bound firm. And to do this should always be a part of the agreement with the reapers, who otherwise will be very negligent in these particulars, to the farmer's great damage and vexation. In rainy catching weather, it is good to take two sheaves from each stook, and parting them in the middle, cap the remainder with them by turning the ears downwards, but this should be done when the weather is dry. If no more than ten sheaves be set up in a stook, two sheaves will cap the other eight.

In cutting wheat, however, whether with the scythe or the sickle, great regard should be had to the degrees of ripeness, which now begins to be pretty well understood in most of the counties in England. If the wheat is left growing till it is full ripe, the coat grows thick and tough, and the meal contracts a brownness that bakers dislike. If it be cut too green, especially in moist weather, it seldom hardens sufficiently for grinding, and has withal a rawness that is very disagreeable in bread. The critical time of cutting is, when the milkiness is just hardened into a firm crud; but as this does not happen to all the ears at the same time in any one field, great judgment is required in distinguishing properly, when, and where, to begin; for generally one part of every field is ready three or four days before the rest. If the weather be set fair, and the sun has remarkable power, it matters not how green the wheat is cut, so that the milk be turned; for it will ripen and
harden

harden in the stalk ; but, if the weather be inclined to rain, the straw should be brown, and the milk well hardened before cut.

Wheat cut at a proper time will sell at a shilling or two a quarter more, than wheat of equal goodness that has stood till full ripe,

In ricking wheat, some are very curious ; for besides raising their ricks upon standards, or staddle stones, as they are commonly called, to prevent the access of vermin, they form a little rising in the middle with dry oat-straw before they begin to build, by which the ears all the way up have an easy inclination, and when they come to thatching make a very regular figure with the innermost sheaves, almost erect. In the Isle of Wight the figure of the ricks is as regular, as if turned in a lave. Others chuse the square form, and bring up their ricks to an edge like the ridges of a house ; but in these operations, perfection is only to be attained by practice ; no written rules will ever avail,

C H A P. II.

Of Rye.

RYE has fewer varieties than almost any other vegetable. We know of none in England but the winter and spring rye ; the first is generally sowed in the neighbourhood where I live in the autumn, and fed off in the spring with great cattle, sheep, and lambs, and is by that means an excellent preparative for turnips ; for as soon as the rye is eaten bare, the ground is ploughed up immediately, and there is generally time to repeat the ploughings two or three times before the turnip-season commences, by which the land is sweetened and mellowed by all the advantages

ages of a summer fallow ; and by that management the farmer is very seldom disappointed of a crop.

In the northern counties, where rye is more frequently mixed with wheat and made bread of than in the southern, it is not uncommon, if Mr. Miller may be credited, to sow rye and wheat together ; but this practice is so very absurd, that if ever it has been usual, it must now be generally exploded. Rye every one knows is the earliest ripe of any grain, wheat generally the latest. How can these two species be made to ripen together ?

Rye is there generally propagated as a summer corn, and answers well ; the straw fetches a great price for thatch, and the grain sells well in the north for meal ; and as it is a hardy plant, and grows upon almost any kind of barren, stoney, gravelly land, it is no wonder that much of it is there cultivated.

It is said, however, by some, to be much addicted to a disease called the BLAST, and under that circumstance if ground into meal and eaten constantly, is of all poisons the most pernicious, for it has been known to kill whole families by piece-meal by rotting off their limbs first, and then leaving them to linger out their lives in extreme misery.

Many instances of this kind are related in the medical essays of foreign countries, and in the Philosophical Transactions of our own. One case however happened in my memory, which, at first, was generally attributed to this cause, but upon proper enquiry, was found to be owing to another ; yet it deserves to be related as it is indeed very singular. The case I mean was that of John Downing of Wattisham in Norfolk : This man had a wife and six children, the eldest a girl of fifteen years of age, the youngest about four months. On Sunday the tenth of January 1762, the eldest complained of a pain in her left leg ; the same evening another girl com-
plained

the first girl aged twelve, both legs below the knees; the second girl aged ten, one leg below the knees; the third girl aged ten, one leg below the knees; the fourth girl aged eight, both legs below the knees; the fifth boy of eight, both legs below the knees; the sixth boy of four, both his feet; and the seventh boy of his fingers for some time, and fine nails; all this was generally in the living upon distempered bread, and many cases of the like kind tho' not general through a whole family, he supposed that bread to be made of rye, but examination however, it does not appear that bread was rye, but damaged wheat. I have this case from memory only and the time when it happened, I judge much importance to trust wholly to the memory, and therefore I had recourse to the Gentleman to confirm the fact. In that Magazine, p. 493, I find the case more fully enquired into and authenticated by the minister at Wattisham, who to the credit of him by Dr. Baker, F. R. S. relative of this poor unhappy family, returned the following effect.

had been damaged ; it had been lodged, gathered, and threshed separately ; it made bad bread, and worse puddings ; but the farmer himself and his family eat of it without hurt except one man whose fingers ends peeled.

FLESH-MEAT ; they bought their pickled-pork of a farmer who eat of the same himself ; but for three weeks before they were taken ill, they had eaten rotten mutton, of which they bought a quarter at a time for a shilling.

From this account the Society were inclined to attribute their misfortune to the bad corn ; and the rather as Mr. Noel, principal Surgeon at the Hospital of Orleans, had acquainted the Academicians at Paris, that he had received in the year, 1710, more than fifty patients into that Hospital, affected with a dry black livid gangrene, which began at the toes, and advanced more or less, sometimes reaching to the thigh, and was supposed to be the effect of bad bread made from a degenerated kind of RYE called in that country *Ergot*.

But what had more particularly impressed my mind with regard to Rye, was, the case which Dr. Tyfflot, reports from Fontanelle of a Peasant at Blois, which exactly resembles that of the family at Wattisham ; this man had eaten *horned rye* in bread, and was seized with a mortification which caused all the toes of one foot to fall off, then the toes of the other, afterwards the remainder of the feet ; and lastly, it eat off the flesh of both his legs and thighs, leaving the bones bare : The Dr. concludes that horned rye, (which, he says, is rye that has suffered an irregular vegetation, producing an excrescence of a brownish, colour,) is not only hurtful to man, but to other animals, and cautions all farmers against its pernicious effects.

Indeed Rye is much in disgrace among the farmers of this country ; yet I cannot but think it more proper

per to sow with pease (I mean the summer sort,) in those counties where the custom is to sow oats or beans with that plant, than either of those last mentioned; for as it is of quicker growth and rises higher than almost any other corn, it would support the pease sooner and better than any other, and if well ripened is no very bad mixture for hogs.

The time of year for sowing winter rye near London, is September, or the beginning of October, where it is intended for early food for cattle in the spring. If for a harvesting crop, or to sow with pease, the spring rye is best, and will do very well if sown in March or April.

Mr. Ellis says, it is a great impoverisher; so that wherever rye is sown the ground ought to be well dressed, and for that purpose prefers foot, salt, linnen rags, the fold, or peat-ashes, to other dressings.

In the counties of Hertford, Buckingham, and Oxford, they sow it, he says, upon the hills in August, and generally feed it off with sheep in the spring; but if flourishing, let it remain for a crop.

In his directions for late sowing it in the north, he particularly recommends well cultivated dry earth, as the only soil for rye; *gravel, sand, chalk, or ground partly of their natures*, are his words; and that the seed be sown in a dry time, adding "that immediately before it is sown or immediately after, 25 bushels of stone lime should be sown by hand as soon after flaking as the hand can bear it; that in default of lime, the same quantity of coal soot about a fortnight after the rye is come up; or in default of both, that five or ten bushels of salt be sown upon an acre, by which a crop of rye sown in February or March may be obtained."

Tho' I have the highest opinion of every sensible practical farmer's judgment when founded upon experience, yet I can by no means subscribe my assent
when

when governed by conjecture. In this light I regard Ellis's ten bushels of salt upon an acre; and I am certain whoever tries the like quantity, or any thing near it, unless to kill the rankest weeds, will repent his rashness. Common salt, instead of enriching land, will make barren for a time the richest soil; but it is like other poisons in a skilful hand, it will correct many crudities, but lavishly apply'd, will cure only by killing.

As the straw is valuable near London, the common method is to reap rye, and as it is early ripe, and comes in at a season when straw generally bears the price of ordinary hay at the London markets, were the grain sold to feed hogs, the culture of it would not be an unprofitable way of employing poor land:

C H A P. III.

Of Barley.

THERE are four sorts of barley commonly sown in this island; but it is observable, that what is sown in the north is hardly known in the south, and what is sown in the south is hardly known in the north. The barley sown in Scotland, is the winter or square barley, called in that country Bear, and in this Bigg. The barley sown in the southern counties of England, is the spring barley, which is easily distinguished by the two orders of beards or eyles, and the thinness of the chaff. That usually sown in the eastern parts, is what is known by the name of sprat barley, is of a rounder and more compacted body, and has its beards longer and more firm and prickly than the former, so that birds seldom meddle with it; the fourth sort of barley, is known by the name of long-eared barley, and is, perhaps, the most profitable of all the barleys; and yet no recommen-

dation has so far prevailed, as to make this species general throughout the kingdom ; indeed the difficulty of procuring the seed may be the reason. There is yet another sort formerly much in use, and known among farmers, by the name of rath ripe barley ; but of late it has fallen into disuse, and therefore hardly worth mentioning. All these different sorts might be cultivated in the same manner ; but there is very little reason to hope that all farmers would concur in one method, was that method ever so perfect.

All arable land is not naturally proper for barley, though almost all arable land may be made so by cultivation. Wherever turneps thrive best, barley may be sown to advantage, and there can be no better preparation for barley than by summer fallowing, sowing turneps, feeding them off, and plowing immediately. Nor can there be a more profitable way of managing arable land than by accompanying the barley with clover or saint-foin seeds, properly adapted to the nature of the soil ; I do not mean by sowing the seeds at the very instant the barley is sown, but only that seeds should, generally speaking, be sown on the same land the same year. If the barley should have the start of the seeds a whole month, provided the season is moist, inclining to rain when the seeds are sown, so much the better ; and by harrowing and rolling them in, the barley will thrive the better, and so will the seeds. Harrowing is apt to startle some farmers, as many of the blades are torn up by the tines ; but for one that is lost by the harrow, five are gained ; for by opening the surface, the root have freedom to tiller and send forth fresh shoots which otherwise perish in the ground. I do not find any particular directions in the Tullian husbandry for the cultivation of barley ; I observe indeed that Mr Tull sometimes drilled, but more often sowed his barley broadcast. Sir Digby Legard however seems so great
a con-

a convert, that he has even persevered in drilling barley, and has made one improvement which I do not find he learnt from his great master; and that is, after the last horse-hoeing he sows turneps in the intervals, which has frequently succeeded to his wish.

There is, however, one material objection against this practice, which in my opinion must infallibly defeat it, that is, in wet years, the encouragement that every horse-hoeing must give to the tillering of fresh stalks from the roots. The bare mention of this objection must strike every farmer at once, and it were needless to enlarge, where the fact is self-evident. I shall therefore refer those who, notwithstanding what I have said, may still be inclined to pursue the horse-hoeing method, to what Sir Digby has said in favour of it, in the *Memoirs of Agriculture* Vol. I. p. 228, & seq.

After what I have already said, it may seem superfluous to use any additional arguments to prevent a waste of seed, both of barley and clover; the usual method of sowing three, and sometimes four bushels of the former upon an acre, is preposterous, when one half of the last quantity is nearly sufficient; and, I am persuaded, that a quart of clover-seed sown upon an acre by a good seedsmen, if the seed be good, will produce more plants than any ground can support. It is no uncommon thing to see the ground matted with clover in the spring, and yet but a puny half starved crop in June, and a worse in August.

On the contrary, I have seen a very thin show of plants in the spring, and yet two stout crops of clover have succeeded at the proper seasons.

There is nothing more deceitful than the old proverb, *If you do not sow, you cannot reap*; from the manner of urging this argument, every common farmer understands, that he is to reap in proportion to the seed he sows, that is, if he sows much, he will

reap much; and, if he is sparing of his seed, the earth will be equally frugal in her produce; that which nothing is more contrary to experience, for the earth has a certain store of nourishment within herself, and, if you pour in upon her a greater number of mowths than that nourishment will sustain, instead of a healthy vigorous produce, you will only have a puny half-starved crop, which though it may appear rich and promising at first, will dwindle and decay before harvest, and not one half of it arrive at maturity.

People are ever apt to impute their disappointment of a crop to the poverty of their lands; whereas, in fact, it is often owing to their own ignorance and avarice in expecting the earth to do that, which in the nature of things is not to be done, that it, to make two things thrive and grow fat, with that which is but just sufficient to maintain one.

If the earth has more nourishment than she has numbers to provide for, she will by no means be niggardly; she will increase her numbers in proportion to her stores; so that, if but ten seeds are sown, and she has provision for twenty, from these ten she will cause the twenty to spring up; you may therefore, by your folly in oppressing her with more than she can maintain, defeat your own purpose; but you never can suffer by trusting her with less.

Against the practice here recommended of sowing seeds with barley, the celebrated Miller inveighs, and calls it a vitious practice established by custom, and not to be altered, though numerous examples could be produced to shew the absurdity of it. But, with Mr. Miller's leave, thousands and ten thousands of examples are annually produced of the rectitude of this custom; and, I believe, not one example can be produced of a miscarriage, when barley and clover have been sown together after a seed-off crop of turneps, upon tolerable good land, and at a proper season,

season, when the land is in perfect order, except from the fly, and that in a great measure may be prevented by sowing quick-lime in two or three days after the clover. The truth is, the better the crop of barley, the greater the probability of a good swart of clover; for the barley shades and shelters the tender blades of clover from the scorching sun, than which nothing is more hurtful to them at a certain time; and as the barley is the quickest of all grain to ripen, the covering is removed, just as the clover begins to have strength enough to support itself against that inconvenience. The crops of clover, that I have known succeed barley the year after sown, without any additional expence to the farmer, have been very great, not less than five loads upon an acre; at the two cuttings, besides pasturage in the preceding autumn, than which no food is of equal goodness for young lambs.

It is ever with reluctance, that I differ from authors of established reputation; but scientific credit may sometimes be obtained by very superficial knowledge, and when once established it may be equally vain to combat that, as to oppose any other kind of prejudice.

The most fatal accident to clover, when sown with barley, happens at the critical season when the barley is cut down; and that is, by the barley's lying too long in swath, in rainy weather. This is not only fatal to the clover, by blanching the leaves, and of course weakening, if not destroying, the roots, but also injurious to the barley, which in such a situation, is apt to sprout, and if long continued, to lose its heart. The only remedy, in this case, that I know of, is to remove the barley from the clover to some vacant place, and then if the barley is hurt, the clover will be saved, as no rains, tho' ever so violent and long continued, can at that time hurt the clover, unless covered

vered by some other crop. But this accident, like all others from the seasons, the farmer must be content to suffer. He is not to repine that the worst has happened, when he himself is conscious that on his part the best has been done.

Hitherto, I have spoken only of preparing land for barley, by sowing turneps, but that practice is not yet so universal as it deserves to be. Many good farmers, where their lands are in heart, sow barley after wheat, especially when a fallow and dunging has preceded the wheat. In this case their method is, to haum or mow the stubble, as soon as harvest is over, and then to plough in what remains to rot in the winter. This is an excellent method; for when the land comes to be stirred again in the spring, it turns up mellow and light, and a third stirring, brings it into excellent order to receive the barley, and the seeds. Either of these two methods, I recommend in preference to all others.

But there is a third, and not a despicable method, practised upon the hills, and that is, to sow barley upon St. Foin leys. This is practised upon land where the farmer does not chuse to hazard a crop of wheat; and it frequently succeeds to admiration, but here no seeds are ever sown with the barley, as pease, or oats, are generally the succeeding crops.

Mr. Tull too, speaks of immense crops of barley after horse-hoed crops of other grain; and I am inclined to think, that where land has been long continued in the culture of one kind of grain only, the crop that succeeds upon a change, be it of what grain it may, will be exceedingly great. For tho' Mr. Tull has with great humour ridiculed the unphilosophic notion of Woodward and Bradley, that every kind of plant finds in the earth a peculiar kind of food, yet it seems certain with respect to the adventitious grain that is usually sown, that the earth de-
lights

lights in change; and that, among the immense variety of vegetable food which nature has treasured up for the sustenance of plants, there may be certain portions of it so fashioned, that tho' they may be rejected by one kind of plant, may yet be received as fuitable to others; not that I imagine roots capable of distinguishing, but being fashioned in different shapes, and some made more delicate than others, what may be too coarse to be received by a slender untractable mouth, may yet be fine enough to be received by a larger and more pliable one.

Soils that are proper for wheat are not always so for barley. Stiff clays will bear good crops of wheat, if well managed; but hardly any culture will prepare them for producing good barley. Gravelly, chalkey, or rich sandy or loamy lands, are the soils in which barley thrives best, and on these soils the best manure is folding.

Barley, next to wheat, is the grain that the farmer is at most pains to cultivate. In some counties, it is the grain, he appropriates to pay his rent. It is a hungry grain, and requires rich nourishment; but it is at the least pains of any that is sown to procure it. The land must be well ploughed to suffer its fibres to pass freely, or a very little obstruction will starve the crop. The drought that hardens the soil will effectually ruin the barley; it is therefore in moderately wet summers that barley succeeds the best. It has been observed, that after long continued drought, if much rain follows, barley will spring up a-fresh, and that when the season for ripening arrives, one part shall be green and but just perhaps in ear, when the other part is full ripe and fit to cut.

Nothing proves a better preparation for barley than the new method successfully practised in the north of planting cabbages. By shading the ground, the cabbages preserve that moisture so necessary for the

the nourishment of barley, and by feeding the cattle bages off late, the earth is kept hollow, and when thoroughly ploughed is easily penetrated by the hair-like fibres that shoot from the roots; yet the soils in which cabbages thrive the best, were it not for these advantages, would be the very worst of all other soils for barley.

Barley for itself does not require deep ploughing; for its roots only skim the surface, and never descend to any great depth; but when clover accompanies barley, the plough should be well earthed. Hence it is, that barley and seeds agree so well together; the barley feeds upon the surface, the clover penetrates the substance; so that neither robs the other.

Farmers generally defer sowing barley till all their other crops are completed; and in truth barley cannot well be sown too late. I am told that in Sweden it is sown, ripened, cut, and gathered in nine weeks time.

Where farmers are curious in their barley, as in the west and vale countries, they exchange their seed at a great distance. That which is carried from the vales into the hill-country will carry a much better body than that which has been continued for any number of years in that meagre soil; and that which is brought from the hills will ripen in the vales sooner by a fortnight than that which is produced from their own seed. I have seen them sowing barley in May in the vale of Evesham, when the weather in April has proved wet.

The last week in March, and the whole month of April, are times proper for sowing barley in the southern counties; but in the northern counties it were better to be sown in March. However, it imports more that the season be consulted than the time; if the weather be dry and the land properly prepared, a week or two sooner or later avails but little. The ground

ground should be well mellowed, moist, and light, when barley is sown upon it.

It is esteemed, tho' I believe erroneously, a far less impoverisher of land than some other sorts of grain, particularly oats; but of that I shall have occasion to speak hereafter.

Barley, in opposition to wheat, should be full ripe before it is cut, and thorough dry before it is ricked or housed; and, as it is the least liable to shed of any grain, it may, for that reason, be more advantageously mowed. It wants neither gatherers, nor binders, and a good mower, when he mows by the acre, will mow two acres a-day. I have heard even of more than this; but labourers will always do double for themselves, to what hey will do for a master.

Calculators mistake greatly, when they rate husbandry labour at less than the labour of ordinary manufacturers. A day labourer, when he works by the piece, earns from fifteen, to twenty shillings a week, in that part of the country where I live; and will grumble, when he receives the largest of these sums, especially if he works for a gentleman. And yet you had better pay him that exorbitant price, than employ him by the day after the rate of eight or nine shillings a week; such is the trim of the labouring poor.

Barley that is cut full ripe, should have the benefit of a shower, before it is carried. This opens the body, and is an advantage to the farmer, as well as to the malster. It not only plumps the grain, but mellows it, and makes it work more kindly.

C H A P. IV.

Of Oats.

O A T S. are of two sorts, the *black*, and the *white*; the *white oat* is in the highest credit all round the sea coasts, as perhaps more generally marketable than the black, tho' the black in some inland counties is preferred for horses. There are likewise two other sorts mentioned by Mr. Miller, the red and the naked oat, neither of which I have ever seen. The red is said to be chiefly cultivated in Derbyshire, Staffordshire, and Cheshire; the naked oat, in Scotland and Wales. Great commendations are bestowed upon these two latter species; and it is surprising, if they are so much preferable as reported, that they have not been introduced about London, where the seed might easily be procured. There is indeed, a species of the white oat, called the Scotch Oat, much cultivated here; but in my neighbourhood the Essex Oat has obtained the preference. The Poland Oat, is likewise in good credit in the London market; it differs, I think, but little from the Scotch Oat, only that it is rounder and shorter. These oats, succeed well, but soon degenerate, if not frequently restored by new seed.

Of all the kinds of oats that I have seen, the Essex, in my estimation, is the best. It is a fine clear-skinned oat, of an elegant shape, and when it meets with a soil it likes, plump and full of meal.

Oats in the south of England, and in the north of Scotland are differently regarded. In Scotland, they are, in general, the bread corn of the common people; in England, they are cultivated as food only for horses. In Scotland, they are not thought to impoverish land, more than any other grain. In England,

gland, they are esteemed so great impoverishers, that a fallow generally succeeds them.

As oats are held in these different degrees of estimation in the two extremes of the same Island, it were worth while to enquire into the cause ; but as disquisitions of this kind are foreign to the purpose of this Treatise, perhaps this may be the subject of some future enquiry. At present I shall only premise, that oats are so far from impoverishing ground, that where they succeed best, they nourish most, and it is no uncommon thing, to find land, judged unfit for the production of other more noble grain, produce two successive crops of oats ; and both plentiful ones ; and this too with no other additional labour or expence bestowed upon the second crop, except ploughing in the stubble as soon as the first is removed. This perhaps is the very best method of preparing for a fallow ; for if, by reason of the severity of the season, the oats should be cut off in the winter by the frost, you are no loser, your fallow goes on. If the oats are not hurt in the winter, your crop remains good, for no subsequent weather will hurt self-sown oats, when once they have escaped the winter frosts ; besides oats are great enemies to weeds, and you frequently see an oat field, tho' perhaps the fourth or fifth crop after a fallow, as clear from weeds, as if it had been the first.

From this known quality of destroying weeds, some Essex farmers who use stable dung upon their fallows, instead of wheat, sow oats as a first crop, as well to take off the rankness of the dung and to sweeten the land for wheat, as to diminish the weeds which stable dung is apt to encrease. This practice however, is liable to several objections, first, it obliges the farmer to sow his wheat upon once plowing, or 2dly to turn up the stubble before it is rotted ; and
thirdly,

thirdly, to have oats mixt with his wheat, which must lessen the value of it at market considerably.

The method which I would recommend for preparing land for oats in the common husbandry, and in general I recommend no other, is

1. Fallow with dung ; 2. Turneps fed off with sheep or other cattle ; 3. Barley with clover ; 4. Clover ; 5. Wheat ; 6. Pease ; 7. Oats ; 8. Oats ; 9. Fallow, with dung.

This course I am persuaded might be practised with advantage in almost any land in England, even the poorest, with the additional assistance I have before prescribed. But in rich land, where no fallowing is necessary, the seventh crop of oats may be succeeded by a crop of winter-tares, which will moisten the ground, and mellow it for a succeeding crop of wheat, with the addition only of a sprinkling of dung and lime, in the manner before directed.

It is no unusual practice to sow oats upon clover ley, *where the land is poor, and has been fed off bare in the winter*, or upon new broken up ground, and after once ploughing, this practice too has its advantages. Oats being a hardy grain, will thrive where other corn will starve, and by this method, a crop is gained while the swart is rotting where otherwise no immediate profit could have been obtained.

Upon clover ley, however, provided the swart were ploughed in early in the winter, and afterwards stirred athwart in February, and finally ploughed for oats in April, a great crop might be expected ; but as most farmers who make oats to follow leys, reserve their leys for winter feed for their cattle, oats, in my opinion, are an improper course ; and pease would succeed much better ; and as for sowing them upon new-broken up ground, tho' they may succeed, and generally do, yet I am persuaded that turneps would prove in the end a much more profitable method

thod of improving land. Oats will follow turneps very advantageously; yet far less so, than wheat after three or four summer ploughings, by which the land is immediately brought into tilth; whereas by any other method, a full year is lost before the earth can be properly pulverized, so as to be fit for the growth of wheat.

There is reason to believe, that the time is approaching, when oats will be more the husbandman's care than at present is generally apprehended; and my reason for it is this, that the culture of wheat is now become an object of the greatest attention throughout Europe, and not in Europe only, but in America, from whence all Italy, Spain and Portugal, at this hour, are chiefly supplied. When our crops of wheat therefore begin to exceed our home consumption, our markets for the overplus will be forestalled, our stock in hand will encrease, and the price will of course sink so low, that no farmer in England will be able to raise it without loss. The consequence will be, a total reverse in the course of husbandry. Oats, which we now purchase from abroad at the expence of half a million annually, must be raised at home, the foreign importation of them must be prohibited, and the lands that are now employed principally in the culture of wheat, must then be converted to the purposes of that grain for which there is the greatest demand; for the farmers, rich as they are now said to be, cannot long continue to raise a dead commodity.

That this change is at no great distance needs not the gift of prophecy to foretell. The lands of France, now that the spirit of agriculture is abroad, will raise more than sufficient in favourable years to supply the inhabitants; the lands of Italy want hardly any culture to assist their fertility, and the Pope is said to have proposed very advantageous terms to encourage

courage their cultivation; and tho' the climate of Spain and Portugal, and the genius of the people promise no great progress in a profession that requires labour, yet the overplus of France, the superabundance of Sicily, and above all, the accumulated produce of our own colonies, will pour upon them such an abundant supply, that those who grow little or no corn for their own subsistence, will eat bread cheaper than those who do; and instead of the bounty now so grievously complained of by some superficial reasoners, double the present bounty will not be sufficient to enable the English merchant to go to market upon equal terms with his competitors.

While the seasons remain unfavourable, and little more wheat is raised in England than consumed, these observations will be read as the reveries of a disordered mind; but when the scene changes, and plenty, (which in the nature of things should be received with thankfulness, as the greatest blessing which heaven can bestow,) overspreads this our land, then will murmuring begin, and poverty, bankruptcy, seizures for rent, decay of trade, imprisonment, beggary, and all the evils attending national distress, will soon follow after; then too will the enormous load of national debt begin to be felt; rents will begin to sink, interest to rise, and gentlemen of small fortunes, having no other means of subsisting, must occupy, or perhaps with more propriety it may be said, rent their own lands, as the sums payable to mortgagees may be equal to the rent of other lands.

It may seem impertinent perhaps to introduce these reflections in a chapter upon oats, but it is to turn the farmer's attention to that object which one day or other may be his great support.

In Scotland, as I am credibly informed, they have oats upon the same ground for four or five years successively without a fallow, a fallow being a term
little

little known in some parts of that country ; and for oats they seldom plough more than once. But, what may be thought still more remarkable, after what has been said, they seldom or ever dress for oats ; but when the land has produced three or four crops, and change of seed is become necessary, they then spread their dung on the stubble, and bout up their land in single ridges by drawing a strait deep furrow the whole length of the oat-field, and meeting it again with the earth turned up by the return of the plough in a parallel furrow ; by this means the dung and the stubble are made to occupy the intermediate space ; where they ferment together during the winter, and in the spring the whole field is again ploughed lengthways into broad lands, on which they sow their barley or beans, and after a single crop, return to oats as before. They neither cross-plough nor fallow, but sometimes after barley, plough three or four times for an intermediate crop of pease, which is always followed by oats. Black oats have, in that country, been continued time immemorial upon the same land, without any change of species.

In this country, where black oats are sown, the only difference in the culture is, that the land is, or ought to be, sooner got ready than is necessary for white oats. Early in February, if the weather will permit, black oats should be in the ground. Those who are nice, prepare their land by ploughing it early in autumn, again after the winter frosts, and a third time just before sowing ; others only break up the ground, and sow as in the former practice.

Indeed the nature of the land is a good direction to an intelligent husbandman ; when I first began farming, led away by book husbandry, I plowed *without fear or art*, and expected to reap much, because I had plowed often ; but having plowed part of a field of six or seven acres thrice, and the last ploughing

ploughing happening at an improper season when the land was wet and poachy, as soon as it was fit to harrow I sowed it with oats, but scarce got back my seed; had I sowed upon the first tith, when the ground was in good order, there is not the least doubt but the crop would have been large. The chief art of the husbandman is to avail himself of the seasons; for all that can be written can only direct in general; many circumstances will present in practice that will contradict the best concerted rules.

The quantity of oats usually sown, is from three to four bushels upon an acre; abundantly too much upon the best land, except when it is very foul, and full of rank weeds, in which case a greater quantity of seed than otherwise would be necessary, may be the best husbandry. Many sow under furrow, and some one cast under furrow, and another on the tith; in like manner as is done in Oxfordshire for wheat. Were the practice of sowing oats as general in England as in Scotland, their culture would be more attended to, and consequently better known. Great crops, I am confident, might be obtained from very indifferent land in this country, as, in Scotland it is no unusual thing to reap four quarters upon an acre of *their* land, after the fourth crop of oats upon the same land, without either dung or fallow. And Mr Bl—kwell, of Lewisham, in Kent, assured me, that from two acres and a half of very indifferent land, he had upwards of thirty quarters of oats: I have since been informed, that about Stratford, nine or ten quarters upon an acre are accounted no very wonderful crop. I have, however, in my own practice never raised seven; but I have observed, that in the slovenly manner of mowing, making, and houghing, one-fourth, moderately speaking, is shattered and wasted. For this reason, though reaping of oats is very expensive, I am determined to try it; the difference

ference for three or four shillings an acre is but ill saved, when compared to such shameful waste.

C H A P. V.

Of Buck or French-Wheat.

THIS grain is not much known, nor propagated in many parts of England. Where it is most cultivated, it is rather by way of improving barren land, than for the profit attending a crop. The method of preparing land by means of this grain is much the same as by vetches in Oxfordshire, and it is rather the better improvement of the two; it is a quick grower, will thrive upon the worst land, kills weeds, and whether eaten off green, or plowed in, is esteemed a great fertilizer of the soil, as it mellows, sweetens, and moistens the hard, dry, and barren mould.

It is likewise in high repute with some gentlemen farmers, who cultivate it as feed for their hogs, poultry, and pigeons; and as it yields much more abundantly than pease, they prefer the culture of it to that grain as less hazardous, buck-wheat seldom failing; and, what is still a greater recommendation, it is in no danger of spoiling after it is cut. As it ripens late, it does not retard the harvesting of other grain; and if the weather proves wet, it will remain abroad without injury till it becomes dry.

Milch cows are said to be fond of it when it is green, and it very much increases their milk, as indeed almost every green plant in summer does.

It is sown in May, about two bushels to an acre, and reaped in August or September, and on any tolerable land will yield about six quarters upon an acre. It is often sown on dry, sandy, or gravelly soils; and if the summer proves wet, great crops may be expected; but, though it thrives well upon poor soils,

soils, those that are rich suit it best. One great advantage taken notice of by Mr. Young in his *Course of Experimental Agriculture*, is, that it is a profitable succedaneum to spring crops, when the season proves unfavourable for sowing them; and he adds, that buck-wheat is often more profitable than barley or oats; but I own, I do not understand his calculations, as the expences throughout are in my opinion much under-rated.

He fixes the true time of sowing to the middle of May, and the time of ripening about the latter end of August.

C H A P. VI.

Of Pease.

THE varieties of this leguminous plant are endless, and it is not within the plan of this work to recite them. As they are among the dainties at the tables of the great, no art, no care, no labour, or expence is wanting to cultivate and improve them; from the field to the garden; from the garden to the hot-bed; and from the hot-bed to the stove they have gradually risen, and they are now to be purchased in almost every month of the year by those who can pay for them; such are the refinements of the present times. Those that remain peculiar to the field, may all be ranged into three classes; the grey, which is the largest; the blue, which is the smallest; and the white, which is the middle size.

The culture of these does not vary much; but the soil on which they thrive best, and the time of planting, admit of variation. The large grey pea delights in a strong heavy soil, like the bean; the blue pea will grow in almost any soil; and the white thrives best in rich, light, sandy soils; on new broken up ground; or, in fine loose friable black mould.

Pease

Pease do well after turneps; they love moisture, but perish among weeds.

The ground on which pease are to be sown, if not preceded by turneps, should be prepared in the winter, well plowed, cleansed and pulverized; the seed should be carefully examined, especially of the grey sort, which is very apt to be foul and damaged. The eye should be particularly examined; if that is cankered, worm-eaten, or any ways hurt, it will never sprout, so that no seed requires so much caution as that of pease.

The Tullian husbandry obtains almost every where about London for the culture of this plant; and the reason is, because pease can be better supported by that culture than by the old method; for it is observed, that where pease are suffered to trail upon the ground, and the weeds to grow through them, no pods grow upon the creeping vines, and only a few upon the curved tops which rise at the extremities of the barren shoots, supported, perhaps, by the more vigorous weeds.

To remedy this, the custom is in those counties where the old husbandry is still continued, to mix them with beans, or scatter oats among them, and as the beans spring up, or the oats spindle, the tendrils of the pease take hold of the growing stalks, and thereby support their feeble vines. The first of these methods is found to succeed well, and has been lately followed in the midland counties, where they drill the small horse-bean and the horn-grey pea together in equal quantities, about a bushel of each to an acre, hoe them, and clear away the weeds, which proves an excellent preparative after wheat, for a subsequent crop of barley and seeds.

In this culture, the wheat stubble is haumed off as soon as the corn is carried, the ground plowed up in broad lands, and suffered to remain in that condition

during the winter. About the latter end of January or sooner, if the season suits, the broad lands are cross-plowed, and afterwards laid down again upon the level, or ridged up, according as the soil is dry or wet. This last ploughing succeeds the other immediately if the ground is not low, and it is usual to strain the seeds after the plough with the hand for the more equal mixture of them. They are found to thrive well together, and the pea and bean straw make excellent winter fodder for their cattle. The second method, that of sowing pease with oats is not so frequent; oats are but a slender support, yet they are sometimes attended with good advantage; but as rye is both a quicker grower, and a taller and stouter plant, where beans is not thought eligible, rye, I think, should take place of oats.

By the Tullian method, the vines are enabled to support themselves. The pease are planted in regular rows, at the distance of about 12 inches from row to row; and when they come up and are standing erect about six or eight inches above the ground, the earth is thrown up to them on both sides, which is readily performed by a hand-hoe contrived on purpose, or by the common Hoe, where the other has not yet been introduced.

Field pease, in most counties of England, at a distance from the metropolis, are introduced as a relief to the ground after severer crops; and it is the prevailing custom to plow but once in the spring for a crop of pease. Thus, at a small expence the husbandman gains sometimes a valuable crop, which the richer it is, the better it prepares the ground for that which is to follow.

When pease succeed best, they leave the land clean and mellow; and in some countries they follow oats, and are thought the best preparation of land for receiving

ceiving wheat, where a fallow is not thought necessary.

In Scotland, if wheat is sown, it always succeeds to pease; and in some parts of England where fallowing loses ground, pease are substituted in the room of a fallow.

Pease are observed to forage below the staple for nourishment to maintain their growth; yet as by the rankness of their shoots, they are very apt to overspread the whole surface, and to exclude the air, where the land is not remarkably fertile, I should be cautious of venturing to sow wheat at so great a risk.

In the ordinary course of rotation, pease are sometimes the fifth, sometimes the eighth crop. As 1. fallow, 2. wheat, 3. barley with seeds, 4. clover, 5. pease, 6. oats, 7. vetches, 8. turneps, 9. summer fallow with wheat; and so the same order repeated. Or 1. fallow, 2. turneps, 3. barley with seeds, 4. clover, 5. wheat, 6. beans, 7. oats, 8. pease, 9. rye fed off in the spring, and fallow for turneps, as before.

Either of these courses is well culculated to keep land in heart; but were I to be permitted to establish one uniform method of rotation, it should be founded on this principle; that the crop that lies longest in the ground, should always be succeeded by the crop that is quickest of growth: thus, barley should always succeed wheat; clover succeed barley; oats succeed clover, which is a meliorating crop; pease succeed oats; turneps succeed pease; and wheat turneps. Thus one uniform course might take place upon one kind of land, which might be varied upon the same principle, and accommodated to ever other kind.

The proper time for sowing grey pease, is, from the beginning of February to the middle of March: For some years past, pease when they were sowed early have produced great crops, though those that

were sowed late, very scanty ones. The proper time for sowing the common hog-pea, is from the beginning of March to the middle of April. If they are sowed after folded turneps, they should be sowed upon one earthing, and the plough should not be suffered to earth too deep; if, after clover, the same; and, if after oats, the land should be winter fallowed, and every way managed as for beans after wheat.

The quantity of seed that is sown, is, from two bushels to ten pecks upon an acre; if drilled, about seven pecks. The small blue pea is seldom sowed, except upon poor land; it is a hardy pea, a great destroyer of weeds, and may be sown from the middle of January to the middle of April; the straw, if cut before it is withered, is esteemed by some excellent winter fodder; others dislike it, because it makes the horses stale of a very high colour, which ignorant people are apt to mistake for blood; it is, however, never given to working horses, without a proportionable quantity of hay preceding it; nor is it given at all, after it has long been thrashed so as to become dry and husky.

As this kind of pea, is generally sown to kill weeds, meliorate the ground, and to bring it into tilth, the quantity of seed that is sown is from three to four bushels; and it being a small seed, it generally so effectually covers the ground, as to answer all the purposes intended. It is a sweet pea, and a great fattener of swine, pigeons, and other poultry.

There are several ways of cutting pease; some cut them with the scythe; others with an edged hook with a long handle; and others again reap them, and roll them up in little cocks, and turn them till they dry. Care, however, should be taken not to let them lie too long; for if they are very dry, and rain comes upon them, they are apt to burst the pods, and shed.

C H A P. VII.

Of Beans.

BEANS, like pease, are in high estimation at the tables of the great; but are seldom introduced after they are arrived at maturity. It is while they are yet in their milky state, that they are eaten as a dainty; they have then a bitter sweet, and like other good things have their allay to heighten their relish. Beans are, therefore, now become more the concern of the gardener than of the farmer; and for one sort, which the latter content themselves to cultivate, the former has found out ten. He has ransacked the globe for varieties, and the meagre diminutive bean of Mazagan, has taken place of the plump broad-bellied bean of Windsor, to the disgrace of the true manly old British taste, and, I think, to the discredit of the art; for surely it would have been more for the honour of horticulture, to have quickened a better than to have introduced a worse species, merely because the worst comes first. But of this enough.

The old species of the field bean has suffered no innovation. It holds its place still; and as it is the properest for the purpose for which it is cultivated, that is, for the food of labouring cattle; it will no doubt continue so to do, while labouring cattle are employed.

This species, for it is certainly distinct, delights in a stiff, strong, heavy, moist soil, inasmuch, that clay grounds are seldom too wet, or too dry for the horse-bean. It is remarkable, that this bean, if in a moist bed, will make its way through the hardest pressed clay that can be trodden; and, yet it comes up with the bluntest *spear* of any of the vegetable tribe.

tribe. It is now the prevailing custom to prepare for beans by a winter fallow, and certainly there can be no better method pursued. Plowing early in autumn; cross-plowing after the frosts have mellowed the ground, and exposing as much of the surface as possible to the vicissitudes of the season, is a most excellent method of preparing and improving land. Gardeners direct trenching; the farmer may trench at a tenth part of the expence, by means of ploughs of easy construction, or indeed by the common ploughs, having a less to follow a greater, and allowing space enough to a ridge; this, indeed, will require a second operation to complete the trenching; but to ground thus prepared, little dung is required, and by the method now in use of pricking in beans, that is, by setting them separately with a dibble, and allowing them room enough for the roots to spread; dung is in a great measure precluded.

Where beans are thus cultivated, they begin about Candlemas, and continue planting till the end of March.

About the middle of April, they begin the first hoeing, and about the middle of May the second. Men, women, and children are employed in this labour; and, though it may appear incredible to those who never saw this work performed, one good hand, with a lad to attend him, will plant an acre a-day, and in two days will hoe it; so that one acre with another, may be said to employ a man six days and a half, reckoning four days for twice hoeing, and one day for setting, and rating the boy's labour at a little more than a third of the man's. At this work a man may be supposed to earn two shillings a-day; so that each acre will cost about 13 shillings, half of which nearly is saved in seed.

To persons not accustomed to this labour, it appears impracticable at any moderate expence; but practice and perseverance overcome many difficulties.

The

The quickest and best method, however, that has yet been contrived, is by means of the drill and the shlem. A man with a drill, that is driven before him like a barrow, will, with a boy and a horse, plant six or seven acres a-day; the boy with the horse, draws a shallow furrow, and the man with the drill follows him, and drops the beans. I myself have a drill in contemplation, that will plant two rows at once, and a plough to answer it; also an instrument to cover the seed that is worked by the barrow. These instruments are all of easy construction, and any common wheel-wright may make them.

The planting of beans, or pricking them, has probably furnished the idea of planting of wheat, and one experiment has already been made of it, which has been attended with uncommon success. A gentleman in Cambridgeshire has this year [1769,] planted an acre of wheat by dibbling in the grains a foot asunder in rows, and the rows at a foot distance from each other; so that each seed has a cube of 1728 solid inches to maintain it, provided the ground be plowed twelve inches deep, and so in proportion to a greater or less depth that the ground may be plowed. The seed was trifling, the increase prodigious; the first not a quart, the latter 39 bushels.

These are not chimerical projects, but grounded upon evidence. In Buckinghamshire and Hertfordshire the practice of dibbling beans is universal; if it answers in beans, why not in wheat? the seed saved in wheat is double the value of the seed saved in beans; the labour in planting the one cannot be much greater than the labour in planting the other, only a little more care is necessary, and if the produce be such as has been reported, and there is no reason to doubt but it may, why not extend the practice with respect to wheat, as well as continue it with respect to beans? Nothing can be urged against

against it, but the want of hands to perform it; but hands I am confident would soon be supplied, were the practice to become the mode of any one place. It is a labour that a child of ten years of age is as capable of as a man of thirty, and much more so than a man of fifty; and it is a labour as proper for girls as for boys; besides, wherever labour is plenty, the place becomes populous, and it is the want of work that impoverishes and depopulates a country.

But to proceed; where the old method of sowing beans at random is continued, they generally sow three bushels upon an acre, and reap about twenty five; but that in a great measure depends upon the season; for in wet years they are apt to shoot up tall and slender, without pods, except a few a-top; and what is still worse, they are frequently attacked by what is called the black dolphin, an insect as pernicious to beans as a similar insect is to hops.

Against this accident, the choice of situation is the best remedy; little inclosures are most apt to be thus infected. Beans delight in the free air, and where the current of air is not interrupted by hedges, hills, or thickets, beans seldom suffer from insects.

I have of late observed a new practice, at least it is new to me, and that is, of sowing clover with beans; the beans were a tolerable crop, and the clover was finely set. It is certain that the land that beans like best, is likewise the best for clover; the land, however, to justify this practice, must be well cleansed before-hand, since no hoeing can be admitted after the seeds are sown. These beans were dropt in to the furrows after the plough, and the seeds were sown and harrowed lightly just before the beans began to appear.

Beans bear the weather better than almost any other grain; they are generally the last cut, and if they are bound in sheaves and set up right, they suffer little from

from rain, and may remain till the weather permits to carry them home dry.

Beans will sweat in the stack or the barn, and are never fit for horses till they have undergone that ferment. When that is over, new beans are better than old ones for horses, as they require less labour in grinding; old horses are very apt to swallow hard beans whole, and it is no uncommon thing to see them void them so; to prevent which hackney-men always give them split.

Mr. Young, in his new experiments in husbandry, recommends the culture of beans after wheat, as the most advantageous scheme of husbandry that can be pursued; but he advises planting them in rows twelve inches a part, and if my memory does not fail me, six inches from bean to bean. This undoubtedly is the proper distance for planting almost any grain, and it is the great desiderium in farming to obtain an instrument that will perform it, as the method by hand is thought too tedious for general practice.

This gentleman from his own experience recommends the alternate change of those two profitable grains upon the same land, for a continuance, and gives good reasons for the one being an excellent preparation for the other.

Indeed there are many gentlemen who make no other change upon their land, but from wheat to barley and clover, and from clover to wheat and barley and clover again, except by sometimes introducing oats instead of barley.

I need not repeat that in changing from wheat to barley or oats, early ploughing after the wheat is carried, is absolutely necessary, in order to obtain all the advantages of the autumnal sun and winter frosts; and that in order to supply a fallow, a light dressing should always precede the barley crop.

Mr.

Mr. Miller recommends the new husbandry strongly for beans, that is, by planting them in rows three feet apart, and horse-hoeing them, and he relates an experiment which he made in 1745, in support of it; with which I shall conclude this chapter. "Being upon a visit at a gentleman's house in Berkshire, the gentleman's bailiff who was wedded to the old practice was very unwilling to depart from it; and having been an old servant in the family his master was willing to hear all that he could say in favour of his obstinacy; however the issue was, that Mr. Miller prevailed on the gentleman to let his bailiff plant one half of the land in *his* way, giving the choice which half he would have, and one half in the new way, and the land was divided and planted accordingly. The summer proving wet, the beans on that part of the field the bailiff had chosen grew so tall and rank, that they produced no pods but on the upper part of the stalks; and when they were threshed out, there were no more than twenty two bushels upon an acre, whereas the other half produced near forty."

C H A P. VIII.

Of Vetches.

THERE is no species of grain, that admits of more varieties than the vetch, fetch, or tare; but those that are most cultivated here are the winter and summer vetch; and they are chiefly used in the southern part of England for soiling horses, and for cleansing the ground, and preparing it for wheat or turneps. Those who want feed for their cattle early in the summer, sow the winter vetch as soon as the harvest is over, or just before, if they have time; and if by the severity of the weather the
young

young plants suffer, they sow the spring vetch, which seldom fails, when sowed in a good season.

The summer vetch is however, not near so profitable. As the quantity to be produced is the great object of the farmer's intention of sowing for feed, there can be no doubt but that will be best answered in the broad-cast way; but when he intends to plant for feed, drilling in rows one foot asunder is then to be preferred.

As it has already been noted of pease, so it may be said of all of the pulse tribe, that when they are suffered to trial upon the ground, the seed they produce is only from the tops. Nature has pointed out to man's observation this lesson by furnishing all of this class with a particular kind of clasper, which enables them to avail themselves of the strength of their more vigorous neighbours to help to keep them up; and, I do think, that rye sown with vetches would be a means of furnishing them with a suitable support, whether sown in drills or at random.

It were needless again to repeat, that grain planted in drills should be frequently hoed and kept clear from weeds; otherwise the weeds, by occupying much the larger space, and being more natural to the soil, will over-power the grain, and ruin the crop, and that more particularly of all of this tribe, than of any other.

In some counties, they have contrived an instrument for that purpose, which they call a *shiem* or *skin*, which by its simple construction seems not unlikely to perform well. It is only four pieces of wood, the two longest about two feet, and the two shortest about 12 inches, all morticed together, so as to form an oblong square. Exactly in the middle of the two sides a mortice is made, about an inch and a quarter wide, and four inches in length, into which is fitted two uprights of the same dimensions

as to the breadth and thickness, but about 12 inches in depth, bored full of holes for setting them higher or lower at pleasure. To the lower ends of these uprights is fastened an iron hoe, made much like a common hoe, only wider, and somewhat broader. This hoe, when it is put on, is lower by three inches than the extremities of the uprights, that it may have room to enter the ground, cut the weeds, and clear the mould under the skim without obstruction. To the fore-part of this instrument is fastened a crane-neck with a handle like that of a child's go-cart to draw it along, and to the hinder-part is fitted a pair of stils, like those of a common plough, to hold it, earth it, and direct it; so that it is drawn by one, and pushed forward and directed by the other; and in this manner two men will hoe two acres a-day, where the rows are 12 or 14 inches a-part. This is a very expeditious, as well as an effectual way of hoeing out weeds; for, whereas, in the common method of hoeing, the tops of the weeds are barely chopped off, and the roots never touched; by this method, not only the tops are taken off, but the crowns of the roots, which are in general the vegetating parts, are cut in two, so that they do not grow again in a considerable time, and many of them never. Probably this instrument might be improved by means of a wheel, which would not only keep it steady and to a proper depth, but facilitate its draught.

In some parts of Oxfordshire, it is the custom to sow summer vetches upon their fallows for wheat, and feed them off by staking of horses upon them, I have been told, that near the villages, the farmers will give the townsmen the ploughing and sowing of the land, provided they will pay for seed, and engage to feed them off by a certain day; at which time precisely they plow in all that are left upon the ground,

ground, and turn them under the furrows, which they account a good dressing; and in this manner they prepare for wheat, and none have better crops.

Mr. Miller speaks of a biennial vetch, which naturally grows in Siberia, and is so hardy, that our frosts will seldom hurt it; as this species is said to remain fresh and vigorous through the winter of the year on which it is sown, the introduction of it here would in a great measure answer the intention of the laudable Society of Arts, who have proposed a premium for the discovery of winter food for cattle, than which nothing would be a greater advantage to this nation.

I should have mentioned, that the Oxfordshire farmers always sow summer vetches; for having winter fallowed their land, they think that by sowing vetches they kill the weeds, and by feeding them off they enrich the soil.

On the contrary, Mr. Miller advises to sow the winter vetch; he prefers the black to the white, he advises to sow in August, about two bushels to an acre if broad cast, and about half that quantity, if in drills. Being early sown, he supposes they will be early ripe, and says they should be cut soon after the pods become brown,

The properest time to cut vetches, is when the weather is settled fair, provided they be tolerably ripe; those who do not save the seed, chuse to cut them just as the pod begins to fill, for then the vetch is fullest of sap; and if they are stacked dry, and well secured by thatch, they are the most reviving food that can be given to horses after being tired or jaded, as the term is, with hard labour. A rack full of vetches and some warm water to a jaded team, are like refreshment to a weary traveller; they recruit the spirits, supple the limbs, and give fresh vigour.

C H A P. IX.

Of Lentils.

LENTILS, or, as Farmer Ellis calls them, *Tillis*, have the smallest seed of any of the pulse kind that are cultivated in England by farmers. They are sown, he says, on the poor chalks, sands, and gravels in the hill countries, where neither the thetch nor pea will thrive. There they flourish, and, upon their upright stalks that rise about 18 inches high, pod plentifully.

Sowed alone, and cut green, they make excellent provender for horses; cows and oxen are equally fond of them, and will fatten fast when fed with them. Swine are no less greedy of their seed than cattle are of the green herb, and no seed that grows is so good for pigeons.

Mr. Miller says they are commonly sown in March, flower in May, and ripen in July.

A bushel and a half is the usual quantity sown upon an acre, according to Mr. Miller. According to Mr. Ellis, one bushel sown upon an acre will produce fifteen. Mr. Miller recommends drilling and hoeing like pease; and adds, that they are the common food of the poorer sort of people in the Islands of the Archipelago, and are frequently used here in soups. For this chapter the reader is wholly indebted to Mr. Ellis and Mr. Miller; the former a practical farmer, the latter sufficiently known.

They are a hardy plant, and may be sown upon one earthing.

C H A P. X.

Of Turneps.

HAVING gone through the varieties of grain most commonly cultivated by the English farmer, I come now to another class of vegetables, that have been lately introduced into field culture, and is, perhaps, the greatest improvement, that has at any period of time enriched the science of husbandry.

The varieties of turneps are not many; and, perhaps, those that are called so, are more owing to the soil in which they grow, than to any real difference in the species. The white turnep and the yellow seem to be the only distinct varieties; the first is generally called the English turneps, the latter the Dutch; but the yellow turnep is more frequent in Scotland, than in either of the other countries. It is never cultivated in the field; because it seldom arrives to any considerable bigness; whereas the white turnep will sometimes weigh ten or twelve pounds; Mr. Tull says fifteen or sixteen, as in the horse-hoeing husbandry he often experienced.

All sorts of land, as Mr. Tull has well observed, when made fine by tillage, or by manure and tillage, will produce turneps; but all sorts of land will not produce crops of equal quantity or goodness. Light, sandy, gravelly, loamy, marly, or rich, black, friable mould are the soils on which turneps thrive best, and wherever turneps thrive, barley will thrive also.

Upon ground well folded or dressed, fallowed, and pulverized, turneps should be sown about the middle of July, and from that time till the latter end of August; but then when they are delayed so long, they will never come to their full growth before the season for feeding them off.

As there is no crop more hazardous than that of turneps, many ways have been devised by farmers to preserve it.

The great enemy to turneps is a small fly, whose numbers are so astonishingly great, that in three or four nights they will eat up the first leaves of a whole field be it ever so large.

To prevent this, some soak the seeds before they sow them in stale urine, in which a quantity of *Affa Foetida* has been dissolved; this embitters the seeds, of the heart of which the two first leaves consist; and some, as a more certain preservative, sow raddish seeds among them, which being sweeter than the turneps the flies attack first; and in the mean time, while they are destroying these, the turneps shoot forth their rough leaves, and then the flies begin to dislike them. A third method is, in moist dewy nights, when the fly has begun his attacks, to roll the ground well with wooden rollers, which lick up millions of these insects, and what remains being locked in the ground, cannot extricate themselves time enough to do mischief. A fourth way is to roll the ground as soon as the turneps are sown, for the last mentioned purpose; but to the rolling of turneps as soon as planted, Mr. Reynolds, a very sensible farmer of Adisham in Kent, objects, because, he says, the clods and pieces of earth are very useful in shading the young turneps from the sun, and in quickening their growth to a very great degree, for when they are exposed to the scorching heat of the sun at the hot season of planting, they make little or no progress, so that if the flies seize them, they are surely gone; but when, on the other hand, they remain unrolled, they will be ten or twelve days growing before they are fully exposed to the sun's heat; by which means they gather strength to resist the enemy. It is, however, this gentleman's advice to roll

roll after the flies have attacked the plants, as by breaking of the clods, many of the flies will be buried by the earth, and others will be licked up.

With deference, however, to this great farmer's opinion, a more certain way than either sowing radish seed or rolling, seems to be to plow a shallow furrow, and scatter some seed after the plough, and then a sprinkling a-top to be harrowed inn; these coming up at different times give a double chance; for it often happens, that a single day saves or destroys a whole crop, by which it should seem that those insects, like locusts, fly in swarms; and tho' imperceptibly, yet by the effects it is manifest, that they will leave one field; and infect another in the short period of a single night.

Another method is often practised, and that is, by sowing half old seed and half new; the new always comes up first, and being destroyed, and the insect departed, the old comes up and yields a crop.

By all these ways farmers have saved, or thought they have saved their crops at one time or other; but when repeated, they have found them all to fail.

The most certain means that I have yet experienced, is, by sowing lime as soon after flaking as it can be handled upon the new sown turneps, just as they begin to sprout. By this method, I, this year, saved a few lands, when all the rest were eaten up and destroyed. Having no more lime ready, and being only encouraged to try the experiment from reading Dr. Home's Treatise of Vegetation, I neglected to send for more, and made use of 10 or 12 bushels of foot upon two or three lands, but foot had no effect; almost every turnep was destroyed, and I have since sown the land with wheat, it being too late for a second trial of turneps. Indeed had I been so inclined, it would not have been easy for me to have repeated the experiment with lime, as my

seedman refused to sow a second portion, being almost blinded by the first. However, by contriving a covering for his face, and putting him on an old frock, I may another year get the better of his scruples, as lime appears to me to be the most powerful preservative against the ravages of these most destructive enemies.

With a view to defeat their attacks, the practice has generally been to sow ten times the quantity of seed necessary to produce a crop; but this only increases the trouble of hoeing when no enemy approaches; for were the number of plants, equal to the number of particles of earth on the field, it would only afford greater plenty to the devourers; but no advantage or benefit at all to the farmer.

It is worth observing, however, that many times part of a field that is poor shall suffer, when another part that is in full heart shall escape. How to account for this, I own, I am much at a loss, because it does not happen particularly from the effect of dung, which probably might taint the seedling leaves with a disagreeable rankness; but I have seen it in three successive instances respecting Lucern, where no dung could possibly have operated.

Mr. Miller takes notice of another enemy, no less hurtful to turneps than the fly just mentioned; and that is, the caterpillar, and advises, as the only remedy, to turn a large parcel of hungry poultry into the field in a morning to destroy them; this puts one in mind of the story of a mountebank, who among other nostrums, boasted of an infallible powder to kill fleas, adding, that if there were millions of them the powder would destroy them all; the people purchased his packets at a great rate, but one wiser than the rest, desiring to know how the powder was to be applied, was answered, that he must take the flea by the back, squeeze him till he gaped, and

and then drop a little of the powder into his mouth ; but, says the countryman, how shall I catch him ?

Also, replied the doctor, you are to look to that.

Mr. Miller has pointed out the remedy, but the farmer is to find the hungry poultry.

It would have been unpardonable in the author of a work like the present, not to have consulted our great English oracle for gardening and agriculture ; but I must frankly declare, that in every article relative to husbandry, to which I have occasionally referred, I have been greatly disappointed, and have discovered a manifest want of practical knowledge, and but a very moderate degree of theoretical.

In the article now before me, though he has manifestly taken all that is not commonly known, from the justly celebrated Jethro Tull, yet to conceal his author, he has not so much as mentioned that gentleman's name, but instead of ascribing the merit of the discovery to him to whom it was due, he quotes the authority of a great lord, who in pursuit of the Tullian principles had repeated an experiment that confirmed them.

Though this unfair treatment of my old friend has excited my indignation, yet let it not be said, that I accuse unjustly ; hear Mr. Tull, and attend to Mr. Miller. “ When, says Mr. Tull, I sowed turneps “ by hand, and hoed them with a hand-hoe, the “ expence was great, and the operation not half “ performed ; when I drilled upon the level, at “ three feet intervals, *a trial was made between* “ *those turneps and a field of the next neighbour's*, and “ the crop was double. I have since found that “ turneps upon the same land, planted on ridges, “ with six feet intervals, make a crop double to “ those that are planted on the level, or even on “ ridges, with three feet intervals.” *Horfe-hoeing Husbandry*, p. 45. printed 1733.

Attend to Mr. Miller ; after reciting the common way of turnep-hoeing ; “ there has also, says he, “ been another method practised *very lately* * by “ *some very curious farmers* in cultivating turneps, “ which is, by sowing the seed in rows with the “ drill-plough. In some places the rows have been “ sown three feet asunder, in others four, in some “ five, and *some six*. The latter has been com- “ mended by *skilful persons* as the most proper dis- “ tance ; for although the intervals are so large, yet “ the crop produced on an acre has been much “ greater, than upon the same quantity of land “ where the rows have been but half the distance, “ and upon all the fields that have been cultivated “ for turneps, the crops have greatly exceeded those “ which have been hand-hoed. *The late Lord Viscountess* was at the expence of making the “ trial of these two different methods of husbandry, “ with the greatest care, by equally dividing the “ same field into different lands, which were alter- “ nately sown in drills, and the intermediate lands “ in broad-cast. The latter were hoed by hand in “ the common method, the other cultivated with “ the hoeing-plough ; and when the roots were fully “ grown, his Lordship had an equal quantity of land, “ which had been sown in the different methods “ measured, and the roots drawn up and weighed ; “ and those roots which had been cultivated by the “ plough were so much larger than the other, that “ the crop of one acre weighed a ton and a half “ more than that of an acre in the other husbandry.”

Thus far Mr. Miller.

And now having spun out to nine and twenty lines what Mr. Tull had told us in ten, what has he said more

* The Edition from which this is copied, was printed in 1768, just two years ago, and Mr. Tull's Book, was printed in 1733. And to my own knowledge, the author had practised drilling of turneps ten years before ; viz. in 1723.

more than Mr. Tull, but that *some curious farmers* sowed their seed with a drill-plow, and that Lord Townshend, had repeated an experiment which Mr. Tull had made before, and had found it to answer just as Mr. Tull had reported; all this while carefully avoiding the bare mention of the name of Mr. Tull, tho' the whole practice he so strongly recommends was Mr. Tull's *sole* discovery, the turnep drill his sole invention, and except Mr. Miller calls Lord Townshend, and such as Lord Townshend, *curious farmers*, never used, it may be presumed, by any *mere farmer* upon the face of the earth,

It is farther remarkable, that in the fourth Edition of Mr. Miller's Dictionary, printed in 1732, just one year before Mr. Tull had published his horse-hoeing husbandry, there is not so much as mention made of drilling, or even so much as sowing turneps in rows; and that in this latter Edition, there is one large folio page, all pilfered from that book without ever mentioning it.

It were unjust, however, to Mr. Miller not to mention what other remedies he prescribes for the preservation of turneps from the fly. The first is, steeping the seeds in water and flour of brimstone; the second in water, with a quantity of the juice of horse-aloes mixed; and the third sowing of foot or tobacco-dust, the first of which I have tried and found ineffectual.

He advises farther, that in order to save good seed, you should transplant some of the *fairest roots* in February, at least two feet asunder every way; and when the seed-pods are formed, you should carefully guard them against birds, otherwise they will devour *it*, especially when *it* is near ripe; at which time, you should either *shoot* the birds as they alight upon the seed, or lay some bird-lined twigs upon *it*, whereby *some of them will be caught*; or, he might have

have added, *lay some salt upon their tails*, for that would have been equally *curious*, and equally pertinent in such a work.

But to proceed; as turneps are now become a material article in English husbandry, we cannot be too particular in our directions for their cultivation, especially as we know that in many of the remote counties, they are hardly yet introduced into general practice.

I have already said, that turneps may be sown from the middle of June, to the middle, or even the latter end of August; but this late sowing must not be upon poor ground, nor in a cold climate. In either of these situations sow early, and hoe early.

In warmer situations, turneps that are intended to stand the winter, should never be sown before the middle of July; and even then, if the season be inclined to moisture, I would not advise the whole intended crop to be hazarded; for turneps when they take to growing suddenly, apple very fast, and arrive at their full growth long before the time that they are in general wanted for winter feed; and when they begin to decay, and the frost comes, if very severe, they rot fast; whereas, if they continue in a progressive vegetative state, they are much better able to resist the effects of severe weather, as every one knows who is the least acquainted with the nature of highly putrescent substances.

The chief reason for sowing thus early is the advantage of having a second chance, if the fly should destroy the first.

The first week in August is the precise time for sowing, if the weather will permit; but the ground should always be full of moisture when turneps are sowed.

The best time to begin hoeing them, is, when the four rough leaves begin to shew themselves vigorous; at that time do not spare the superfluous

mercy plants ; but remember, if one plant is left within five or six inches of another, it is near enough. I have seen farmers tremble and turn away when they have beheld the hoers unmercifully root up, like weeds, the thriving turneps, and yet they left many more behind than they ought. Indeed few people are so curious about setting out the plants at the first hoeing as at the second ; for then no plant should be left nearer to another than six or eight inches.

After the second hoeing is performed, which should always be done in dry weather, and before the weeds get too much a-head, the turneps may be permitted to continue unmolested till they are wanted for sheep or neat cattle.

If the ground whereon the turneps grow be naturally dry, farmers contrive to feed them off with sheep, and for that purpose they generally prepare a quantity of hurdles sufficient to hurdle off just such a proportion of the turneps, as the sheep can eat up clean in one day, allowing the sheep room to range without being crowded ; and as they are very apt to make waste, most people pull the turneps up with a kind of fork bent on purpose like a tailing fork, with which a man will pull up in one hour as many turneps as will serve a score of sheep a-day ; and there is now an engine contrived under the patronage of the Society of Arts, that will slice them faster than any man can pull them up ; so that it is the farmer's own fault now if any waste is made of his turneps. This engine, however, is seldom used, but when the turneps are carried off the field, washed, and given to fattening cattle.

If the ground lies wet, few people care to hazard their sheep upon it in the winter season for fear of the rot ; and in that case, the turneps must either be pulled up and carried off to some adjoining field, or carried to the homestead for cows and other cattle.

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Sometimes, indeed, in the neighbourhood of London, they are loaded up and carried to market, but in remote countries that cannot be practised. It is seldom, however, that turneps remain on hand, as at the season of the year when they are in greatest perfection, almost all kinds of cattle are in the greatest want of food; but even supposing no demand for turneps, and that the farmer was under a necessity of plowing them up, he would then be no sufferer: for there is no better manure than rotten vegetables, and turneps, as they are highly putrescent, are as rich a dressing as any. Mr. Tull observes, that barley having been sown in a field, in which some turneps that were left for seed had rotted, the barley on the spots whereon the turneps had stood, appeared like those on which a horse had urined in tilled ground, of a deeper green colour, and much higher and thicker than the barley that grew round those spots. This, however, was only a casualty, and such casualties sometimes lead to very valuable discoveries.

Turneps being an excellent food for ewes and lambs in the spring, if they continue sound, and are not wanted for fattening cattle, they are yet in request for this purpose; and no-body ever wanted customers for a good field of turneps that I have ever heard of.

As to the drilling of turneps and horse-hoeing them, tho' it may be an excellent method, yet it has never been practised in my neighbourhood where turneps are generally sown. It has been observed, indeed, that where turneps stand thin, they generally arrive to the greatest size; but I have never seen any of that monstrous size Mr. Tull speaks of, weighing twelve, fourteen, and even sixteen pounds a-piece, yet the news-papers have lately informed us of a turnep that weighed thirty-six pounds. But
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were these huge turneps common, farmers would not so well approve of them, as of those of a moderate size. These are readier prepared for sheep, and not less so for larger cattle; the others are troublesome to slice, and without slicing half of them are wasted.

In Norfolk, Suffolk, and several other counties, both sheep and neat cattle are fattened with turneps, and some, I am told, who are curious in the practice know to a pound the proportion between the feed and the fattening; that is, how many stone of flesh a ton of turneps will produce. Without this knowledge the graziers trade would be a hazardous employment; for he who would know his profit must first calculate his cost, and sell accordingly; but turneps in those counties begin to give place to carrots, a much more substantial food and more heartening.

C H A P. XI.

Of Carrots.

Foreigners have said so much in recommendation of carrots not only as a winter feed for cattle, but also as a constant feed for horses, that the Society of Arts, moved by a laudable desire of extending every probable improvement, published some years ago a considerable premium for sowing the greatest number of acres with that root for the feeding of cattle only; at the same time making it a condition, that whoever should obtain the prize, should give an account of the soil, culture, time of taking up, produce, and effects on cattle, in order to entitle him to the receipt of it.

In consequence of this encouragement many candidates appeared, and one in particular, who had planted no less than thirty acres with carrots, and had converted the produce to all the purposes the society intended,

intended, lodged his claim, and after fulfilling the conditions, received the prize. The account he gave was ordered by the society to be published; and it is upon the authority of that publication, that the following method is recommended.

Mr. Billing, the successful candidate, advises the plowing of the land intended for carrots in autumn, that it may have all the benefit of the winter frosts for mellowing the soil, and fitting it in the spring for the reception of the seeds. The land he sowed his carrots upon differed in different fields, and even in the same field the soil was not all of one kind. As the soil was different, so were the preceding crops, and of course the whole management. The quantity of land by mensuration was exactly thirty acres and one half, divided into three parcels; one of thirteen acres bore wheat the year before; one of half an acre had borne clover; and on the third of seventeen acres, turneps were fed off in the winter. The piece of thirteen acres was a cold loamy soil, shallow, and upon a sort of loamy gravel; the half acre was a soil much mixed upon a moist clay; and the seventeen-acre piece of two distinct species, fourteen acres being a light and dry soil, newly improved with marle, the other three a shallow black sand, upon a kind of imperfect grit-stone, called in Norfolk, carr-stone.

The wheat and clover stubble he split down in November; the land that had been turneps, he let alone till the end of January. Of the thirteen acres, six had been dunged for the wheat, four and a half not dunged at all; and two and a half were dunged, on purpose for the carrots, as was also the clover ley.

Of the seventeen acres that had been turneps, part had been folded before the turneps were sown, and all of it was fed off with sheep. The wheat and clover stubbles were plowed three times; the piece after turneps but twice, the first time but shallow,

low, the second time as deep as the staple would permit.

The land being in this manner prepared, he sowed four pounds of seed upon an acre, just as turnep seed is sowed, only passing it through a wire chaff sieve to make it separate, first having tried sand for that purpose, and found it ineffectual.

Carrots are long before they come up, and being sowed early, the weeds would be an almost insurmountable impediment to their growth, were they of a nature like other plants, as at that season of the year the weeds vegetate vigorously, and cover the ground before the carrots can appear: but weeds do not much hurt carrots; on the contrary, they moisten the ground, and seem to facilitate their rising.

In this respect, turneps differ from carrots materially; for they not only come up quicker, but being sown after Midsummer when the vegetative power of the weeds are exhausted, they rise without obstruction; yet they are more liable to fail than carrots. Carrots however, are much more chargeable to hoe than turneps, as they are abundantly more troublesome to distinguish and set out. As the price of hoeing differs in different counties, there is no forming a general rate for this kind of labour. Mr. Billing's cost him, from eighth to twelve shillings an acre the first time; the second not more than half. After hoeing, which should always be done in dry weather, Mr. Billing advises harrowing; the carrots will not be hurt by it; the weeds will be cleared away; and the ground loosened by it. When the land is made perfectly clean before-hand, once hoeing may suffice; but harrowing should never be omitted, as often as the soil begins to bind.

The culture being sufficiently explained, Mr. Billing next proceeds to shew the produce; and here it is worthy of note, that on the latest dunged pieces the
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the carrots were the best. Many carrots out of the two pieces, that had been drilled on purpose for the carrots, measured two feet in length, and from twelve to fourteen inches in circumference, measuring at the crown; some on the half acre piece measured still more. On the two acres and a half dunged on purpose, as has been said, the produce was from 22 to 24 cart loads per acre, or about 55 or 56 cart loads in the whole. The half acre clover-ley produced about 12 loads; the six acres and a half dunged for wheat, from 18 to 20 cart loads per acre; the four acres not dunged at all, produced from 12 to 14 loads per acre; on the 17 acre piece that had been turneps, he had from 16 to 18 cart loads per acre on fourteen acres of it; but on the remaining three acres a very poor crop. Upon the whole, he computes the produce of the 35 acres and a half, at 510 cart loads, equal in use and effect to near 1000 loads of turneps, or 300 loads of hay, as experience convinced him in the various ways that he had tried them.

Having thus ascertained the produce, Mr. Billing's next care is to inform the society of the best method of drawing carrots in general, which, he says, is with a four-tined fork, with which a man breaks the ground six or eight inches deep very carefully without injuring the carrots; and is followed by a little boy, who gathers the carrots and throws them in heaps.

The season for drawing carrots is soon after Michaelmas, but Mr. Billing chose to draw his about three weeks later. As the cattle he meant to feed on them had never been used to so hard a food, he thought it best to give them at the same time both cabbages and carrots, lest they should suffer by a distaste at the beginning. He had about forty loads of cabbages growing on one half acre, equal in use,

as appeared upon trial, to about 17 or 18 loads of carrots; and here I cannot help remarking the much greater advantage of growing cabbages, than even carrots, if this representation be just; for if Mr. Billing had forty loads of cabbages grow upon *half* an acre, and those forty loads of cabbages were equal in effect to 18 loads of carrots, then Mr. Billing reaped more profit from half an acre cultivated with cabbages, than he did from a whole acre cultivated with carrots upon an average of the whole produce, and that too with much less trouble, for the cutting of cabbages and the digging of carrots will bear no comparison, in point of labour and expence. Cattle of every sort, horses excepted, naturally eat cabbages, and it was not long before they gradually learnt to eat carrots, and when they had learnt, they preferred them.

Both the cabbages and carrots, and afterwards the latter with turneps, were brought from the place where they grew to a pasture close; and without any other preparation than shaking off the dirt, they were dispersed on the ground for the cattle to feed on promiscuously.

It were foreign to my design to follow Mr. Billing through the whole progress of fattening his cattle; let it suffice to say, that with the crop of carrots added to the cabbages already mentioned, and a small proportion of turneps by way of change, he fatted 33 neat beasts, and 49 earling weathers. To the 33 neat beasts, and 49 weathers, he allowed one load of turneps when his cabbages were spent, and three loads of carrots each day, and they fatted as fast upon these, as upon seven loads of turneps, as he knew by experience.

He also fed 16 working horses with these carrots, without hay or corn during the winter, except when they carried corn to Brancaster market, at 16 miles distance;

distance; and to the team employed in this service he allowed only a bushel of oats a-day. Pease straw, chaff and carrots yielded all their ordinary food. For the horses Mr. Billing had the carrots washed, their heads and tails chopped off, which served the hogs, and sometimes they had a cut or two besides. The sixteen horses eat two loads of carrots a week, equal to more than a load of hay. Mr. Billing, however, has no otherwise ascertained the quantity contained in a load, than by equalling it to the effects of a given quantity of food quite different in quality, the exact measure of which too is equally indeterminate. For a load of hay is in some places an exact ton, in others 2200 lb. in others 2500 lb. and about London only 1800 lb.

He is equally unintelligible in the account of his manner of drawing his carrots, though that is a very material article. It should seem that at first he pulled up his carrots by means of a man and a boy, who carried them to a feeding close, and there dispersed them about for the cattle to pick up; but afterwards, he says, that he made use of his plough, turned his cattle into the same field where the carrots grew, and left them to pick them up, dirty as they were, for their own subsistence. This seems to be implied, but here we are not told what quantity he plowed up at a time, whether more than the cattle eat in a day, or only the exact quantity; or whether the carrots the horses eat were plowed up fresh, or whether he had any method of keeping them for future use after being dug or plowed up.

It should seem by some expressions indeed, that he suffered them to continue in the ground all the winter, as he says they were difficult to be dug up during the hard frosts; but if carrots will keep in the ground without damage during the winter, that circumstance should have been particularly taken notice of,

of, as carrots will then prove a considerable addition to turneps for a winter food.

I have already taken notice of the practice about Guildford, of raising carrots; and it should seem that their culture is better known than the uses to which they may be applied; for, besides for neat cattle, sheep, and horses, they are a most excellent food for hogs, and even for dogs; but for these last they must be boiled, and mixed with barley-meal. There is not a more wholesome food in the world for hounds than this mixture; nor any so cheap. Deer too are very fond of carrots, and no food preserves them so well in flesh in the winter.

In soils that are shallow, but otherwise light, carrots may be raised to great advantage, by ridging up the earth, either with a double-boarded plough, which is the quickest, or with the common plough, and sowing the seeds thin on the tops of the ridges. In this situation they have more depth of earth to lengthen their roots, they are less liable to be annoyed with weeds, are more easily hoed with the hoe plough, and more readily dug up either with the plough or the fork. It had been needless to repeat, after attending to the success of Mr. Billing's experiments, that the ground for carrots should be dressed with dung, were it not that Mr. Miller has advised the contrary: The difference, however, of fresh dunging according to Mr. Billing, and dunging the year before, according to Mr. Miller, was as 24 to 20, or 18 to 22.

Where the soil is by nature a rich deep sand, these carrots will grow to an astonishing magnitude, especially if the drill culture be introduced. Indeed, the drill culture is so much preferable to the common husbandry for all plants that require hoeing, that it is much to be wondered it is not universally prevalent. A very little more trouble is necessary in

the sowing, than in the common method, even where there are no particular instruments at hand to perform it. When the earth is made perfectly fine before the last plowing, by lengthening the mould-board, about four or five inches, the furrows may be widened, and the seed sown into the hollows as the land lies rough, by which they will be more readily covered with the harrow, and will come up almost as regular as with the drill; however, they will come up so regular, that the hoe may be easily introduced between the rows, and the plants in the rows may be more readily set out.

Turneps may be sown with the utmost nicety, by means of a bottle and a cork: let the bottle be filled with seed, and the cork perforated with a hot iron, observing to run the iron into the cork from the outer end, and when it has pierced the inner end, and made it wide enough for two or three seeds to pass at a time; then you are to widen the outer end, by carrying your hand that holds the iron round in a circle while the iron is yet hot, which will gradually widen the hole from the point where the seeds are to enter, to the mouth of the cork whence they are to issue forth. This will facilitate the free passage of the seed. With this simple contrivance, a man may accompany the plough, and sow the hollows as fast as the plough turns up the furrows. Carrots cannot be sown in this manner, because of the formation of their seed; they may, however, be sown by hand, and though many of them will be buried in the hollows, yet enough will come up to make a crop.

Carrots may be sown from March to the middle of May. As they are a more certain crop than turneps, and lately discovered to be a richer and even a more general food for animals of various sorts, there can be no doubt but the culture of them will be every day extended. The manner of propagat-
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ing the seed is by transplantation. The finest, clearest, and best shaped roots should be saved for that purpose, and in February should be set in the ground at a proper distance; in August the seed will be ripe, and may be gathered like other seed.

C H A P. XII.

Of Potatoes.

THE Potatoe, as Mr. Irwin has well observed, is become a root of such immense utility, especially to the poorer sort of people, not only in Ireland, where it is the chief support of their families, but in England also, where without the plentiful use of it in the late dear times, the distress would have been abundantly aggravated. As it is a wholesome root, it is likewise very grateful, and not only so but nourishing; quickly appeasing hunger, and generally agreeing with the stomachs of young and old. It has likewise one peculiar quality to recommend it to the tables of the great, that it is favourable to population; for it has been observed, that in the western parts of Ireland where it is almost the only dyet of the labouring poor, it is no unusual thing to see six, seven, eight, ten, and sometimes more children, the issue of one couple, starting almost naked out of a miserable cabin upon the approach of an accidental traveller, or any other object of childish curiosity; neither is the potatoe less friendly to beauty than productive of vigour; for among the healthy progeny that crowd the cabins of those mean people, as well as among the numerous little ones that fill the cottages in Lancashire, where next to Ireland, the potatoe is most generally used as food, the admirable complexions of the wenches are so remarkably delicate,

as to excite in their superiors very friendly and flattering sensations.

It were needless to enlarge upon the nutritive qualities of this root. Its well known effects, and the profit that has attended its culture wherever it has been generally propagated, has so far already operated, as to extend its use to every part of the known world. In the neighbourhood of London so great a quantity is raised annually, as to fill the markets even to profusion. More to the south, in Cornwall and in Wales, the potatoe is rather confined to the garden, than introduced into the field culture. In the north it is quite the reverse. In Ireland they are cultivated for a staple, and in Scotland now more than ever. It has been found that their barren heaths are proper soils for their propagation, and land which formerly was looked upon as barren wastes, has been improved by the culture of potatoes to a very great value.

Their method is in the spring to set fire to a certain quantity of heath, and having burnt the brush wood close to the surface, they mark it out into beds of four or five feet wide, and of a length proportioned to the extent of the ground that is to be improved; these beds they cover with straw or fern as they can best spare, and having divided their potatoes into proper eyes for seed, they place them regularly in rows, about a foot distant from each other; and then with spades made on purpose, they dig up the alleys that divide the beds by shaping the surface into turfs; with these turfs they cover the potatoes in the beds, by turning them like a pancake, flat upon them, in such a manner that the swart of the alley meets the swart of the bed, and the straw or fern with the seed potatoes lie spread between them. Over this with a shovel they throw the crumbs from the alley which closes up the seams, and having trimmed
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up the sides, narrowing the bed a little towards the top, proceed in the same manner to another bed ; and so on till the whole plantation is completed.

This work is generally begun towards the latter end of March, or as soon after as the weather will permit, and continued without intermission till the beds have received their seeds and dressing ; two men generally do this work in partnership ; and by the time the beds have all been covered, as has already been described, those that were first covered will be ready to put forth weeds ; to these then the men return, and placing themselves with their spades one opposite to the other, they dig a second spit out of the alleys, throwing the mould over the beds so dexterously, as just to meet in the middle ; and then, if any hollow places appear, they level them with the crumbs from the alley, and after raking the bed smooth, they proceed as before. In this manner it is pleasant to see with what neatness both the tops of the beds and the bottoms of the alleys lie, when the whole of this operation is performed.

To these plantations little more is necessary to be done, till the potatoes are ready for digging ; by which time the ashes of the consumed heath having dissolved the dry straw or fern, and destroyed the cohesion of the two surfaces, the whole, by means of the putrid fermentation of the different substances, is incorporated into one mass, and the earth in turning up to uncover the potatoes, rises rich and mellow, and fit to receive any crop of corn that the climate will ripen and bring to perfection. The potatoes in the mean time, warmed by the intestine heat of the fermenting bodies, and nourished by the moisture, come forth in clusters ; and it is wonderful to see in that cold climate, what sudden improvement is produced by this simple management. The ground in
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getting the potatoes is returned to the alleys, and is again levelled and fitted for the plough.

Another way they have in that country of planting potatoes where the land is already cultivated, and that is, by trenching, which is done in this manner. One man digs a trench, about eighteen inches wide, and eight or nine inches deep, and clears the earth out before him; another clears out the crumbs, and while he is so doing, the first man returns behind, and skims the weeds from the beds, and throws them with some fresh fern into the bottom of the trench; by which time the second man having smoothed out the crumbs all along, returns to the head of the trench, and with his shovel covers the weeds and the fern about three inches deep; and having the prepared seed ready, drops one or two eyes in a place, all along the trench, at about a foot, or fifteen inches apart; and then the first man fills up the trench, and levels it. In this manner they proceed till the whole plot is planted. This too, like the former, produces a great increase, and prepares the ground sufficiently for a succeeding crop of corn; but more attention is required in this method in order to keep down the weeds, than in the former; yet no part of husbandry rewards the labour more liberally than the careful cultivation of potatoes.

In Ireland this culture is much better understood, and consequently more generally dexterously and performed than in Scotland, or any other part of the known world. There they sow potatoes after the plough, the plowman letting the set drop in as he goes along; and the harrow fitted to the same plough, following him close behind, covers them in. Over all they lay dung, letting it frequently lie uncovered till the moisture is either washed into the ground by the rains, or exhaled by the power of the sun.

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From this idea of dropping the potatoes after the plough, Mr. Randal, an ingenious mechanic at Heath in Yorkshire, constructed a drill-plough for planting potatoes, and wrote largely on the advantages of their culture in common fields. He recommended them as an excellent food for hogs; and it is certain that hogs are very fond of them, and turned into a field where they grow without wringing, will rout them up, and clear the ground better than the most careful labourer. According to this gentleman's practice, the potatoes are to be planted whole; the middling size are to be selected; the rows are to be ranged at three feet distance; and the hoe-plough is to be introduced to loosen the earth, and to keep it clean.

It were protracting this article to an unnecessary length, to recite all the methods in use in Ireland for raising potatoes; let it suffice to say, that in general they bestow much pains in bringing their potatoe grounds into good tilth; that they generally sand (a practice not much known in England) or manure before planting; and that the most common way of planting among the poorer sort is by dibbling.

In Lancashire, where the culture of potatoes in the open field first came into practice in England, they were more curious than in Ireland; there they raised their ground into little hillocks, not unlike our hop hills; and having prepared the seed, and formed a base, about six inches above the ordinary level, they placed three or four eyes in every hill, whose diameter measured about three feet. These they covered lightly at first with long dung, fern, or any kind of warm manure; and when the plants began to sprout, they kept moulding up the hills, so as not to retard the plants from rising, but to choke the weeds as fast as they appeared. This they continued to do

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as often as the weeds spring up, till the hill was a considerable height; and it was surprizing to see what a quantity of potatoes one of those hills produced. The potatoes generally planted in this manner were the Irish Purple, which being the most forward of all the sets, they began to dig them up in August, and sowed wheat directly upon once plowing. This method, however, has since given way to a more expeditious and less expensive practice. They now generally plow, and drop the sets in every other furrow after the plough; or, where the land is sett to poor labourers in small patches, it is trenched in the common manner of trenching, some light dressing placed underneath with a thin coat of mould over it; and then the sets are placed at regular distances, about 12 inches a-part, and the earth lightly filled in to cover them.

In wheat lands, the stubble serves for an under dressing, and being carefully bedded; by its rotting in the winter, it lightens the soil, and prepares it against the spring for the reception of the sets; which are then planted in regular lines, by making a shallow furrow, after the ground has been well dug, and placing the sets by hand, or having strained a line, they plant them with a dibble in the same manner; as in other counties they plant beans.

For this purpose large tracts are divided into small patches, and lett out to day labourers at a great price, who having discovered an early species, obtain two crops a year.

This species, I am informed, are highly valued, and may be substituted instead of rye in ordinary bread. The bread is readily prepared, and is moist and more wholesome than that which is made of a mixture of wheat and rye. Of this discovery the poor may avail themselves in time of dearth.

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In other places, particularly about Stratford, it is, common for farmers to let certain portions of land to their labourers who agree to dress, cleanse, and plant potatoes during the summer, and to clear the ground by a certain time in the same manner as labourers do with respect to carrots about Guildford, and nearly upon the same conditions. This prepares the land for corn, and generally speaking a good crop succeeds.

One inconvenience indeed, seems to attend the practice of following potatoes by wheat, and that is, in seasons like the present [1770] when rains prevail, the lands cannot be plowed in time, after clearing the potatoes from the ground, and the sowing must consequently be retarded till the spring, but whether that may or may not be to the farmer's loss will depend upon the weather. I am told that one of those potatoe farmers sowed 100 acres of spring wheat last season, and besides recovering the 50*l*. premium given by the Society of Arts, reaped a most plentiful crop.

A gentleman in my neighbourhood being desirous of planting lucern, prepared a small field for that purpose by a summer fallow, and a good dressing. In the spring he employed his gardner, with the assistance of a sufficient number of labourers to trench it in the usual manner; but every alternate trench he caused to be bottomed by the mowings of his walks, and a slight spit of the upper earth being thrown upon the mowings, cuttings of potatoes 18 inches apart were dropt upon the mold, the trenching went on, and the whole field of about two acres was planted in this alternate manner, fern supplying the want of mowings when his store of that was exhausted. This was in March, and about the beginning of April the trenching being completed, the lucern was drilled upon the intermediate spaces. It succeeded to his wish, and at the season for getting the potatoes, when

when they came to dig between the rows of lucern, the size of the roots is hardly to be credited ; many single potatoes weighed from one to two pounds, and some weighed even more, such potatoes I never beheld. They were of the common Lancashire kind, eat sweet, firm, and mealy ; and all who saw them were astonished at their size.

The lucern by digging up the potatoes was admirably revived, the rich mold that covered the potatoes was again brought up to the surface, and the soil which before was but indifferent, was by this culture very much improved. The lucern has thriven well this succeeding summer. How it may fare hereafter cannot yet be foreseen. This is only the second winter, the experiment being made in the beginning of 1768, and the potatoes gathered about the Michaelmas following.

It is certainly a mistake that potatoes will not thrive two years successively on the same ground : I rather believe that were they to be continued according to the drill husbandry, they would every year increase in number, tho' perhaps they might not enlarge proportionably in size. I have continued them three years in my garden upon the same spot without dunging and find no diminution of fizable roots tho' a very considerable increase of small ones. This may be owing to a number of seedlings escaping the notice of the gardner in digging ; these seedlings fill the ground with small roots, but do not seem to retard the growth of the roots proceeding from full-grown plants. From this observation I think it clear that planting small potatoes for seed, is a wrong practice ; and I have my objections against planting large potatoes whole, the chief of which are that so many strings springing from one centre, are apt to intersect and entangle one another ; and that tho' they do spread in several directions, by which they may be
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supposed to collect their nourishment with tolerable facility, yet they certainly cannot so regularly dispose of themselves, but that in many places they must rob one another.

The potatoe is not a native of this climate, tho' no plant thrives better in it. It is said to have been brought into these kingdoms by Sir Walter Raleigh, and first planted at Cork in Ireland, where they boiled and eat the apples before they discovered the nutritious quality of the roots. Mr. Miller has mentioned two varieties only, but Mr. Maxwell of Arkeland in Scotland has particularly distinguished six; the *long red*; the *round red*; the *long white*; the *round white*, or Spanish; the *blue*; the *leather coat*; and the Irish *purple* that ripens a month sooner than the rest, tho' planted about the same time. The *round red* is that commonly planted in Lancashire, and from thence transplanted about London; but it is remarkable that if the seed is not changed, they degenerate into a paler red, gradually tending to white, become more and more moist, and at length waxy, a property that wholly disqualifies them for bread, to the augmentation of which the dry mealy sort in dear times make a very palatable and wholesome addition.

Some, Mr. Miller says, propagate them from seed, by which they forward their growth so much as to have them two months after planting. That seed is the most natural way of propagating all plants cannot be denied, but if it be the readiest way of propagating potatoes, potatoes must in this respect differ from other plants; for where roots or setts can be made to answer the same intention, the growth is generally forwarded thereby in a very considerable degree.

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The moment when this article was preparing for the press, I learnt the true method of raising potatoes from seed, as it is now practised in the neighbourhood of Chester.

It seemed to me very extraordinary, that raising potatoes from seed, should be a readier means of procuring them early, than propagating them from sets; but the wonder will cease, when the reader is informed that it is three years before this is accomplished.

The first year, (the planter having provided himself with ripe seeds the preceeding autumn,) those seeds, (or aples, in which many seeds are included,) are planted under warm hedges about the usual time of planting the common potatoes. During the summer the plants rising from those seeds are well hoed, and carefully weeded; and about the latter end of September the ground is dug, the young seedlings gathered, the earth about them just rubbed off, the strings to which they adhere separated, and the little knobs which at first are no bigger than horse-beans, laid up in sand, and there preserved during the winter.

The following spring, these seedlings are planted in the same manner as the apples were planted the year before, only in greater numbers; the ground on which these are planted is always prepared on purpose by a proper dressing and winter fallow; and when the season arrives, drills are made, and those seedlings dropped into them at two or three inches distance from one another. These plantations are always well hoed, weeded, and cleansed; and about the latter end of August are dug, and the potatoes taken up, managed exactly like the seedlings; and carefully preserved till the next season for planting.

The third spring they begin to plant the second years potatoes, the size of which is encreased to that of a walnut. This they do as soon after Candellmas

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as the weather will permit. Their method is, a man with a kind of shovel first makes a shallow trench, into which a boy or girl that follows the man drops the seedlings at about four or five inches each from the other, and when one row is thus planted, the man, in returning, throws the earth of the second trench into the first, which fills it, and covers the seed; in this manner they proceed, till the whole plantation is completed; when that is done, some long dung is spread along the rows, and nothing more is necessary till the weeds begin to appear rank; as soon as that happens, the man with his instrument pares off the weeds between the rows, and lightly throws the earth that he takes off in paring over the rising potatoes, which covers the dung, and nourishes the plants. Two or three hoeings of this kind generally completes the process; for before midsummer the potatoes thus manured are full ripe, and a set of hands are always kept in readiness to dig them up, and plant others in their room, which they do by dibbling without any other preparation. In this manner they procure two crops a-year.

For the early potatoes, there is always a great demand. They sell them by the hundred to persons who ship them off, and make considerable advantage by that traffic. They do not grow large, but they are very delicious.

The Potatoes that follow this early crop, grow to a very large size; they are ready to gather about All-Hollantide, when they are succeeded by wheat, the sowing of which is frequently deferred till spring; notwithstanding which they have generally heavy crops.

C H A P. XIII.

Of Clover.

CLOVER is the second great addition which has been made to the treasures of husbandry within the short period of an hundred years. I have a book before me printed so late as the beginning of the present century, of no small repute at the time that it was written, a passage or two from which will now be accounted a great curiosity. The writer admits that lands which this year may not be worth five shillings an acre, may the next by sowing clover, or St. Foin be worth thirty shillings; "but why," says he, must the antient fundamental course which has been found profitable and useful for so many ages be expelled to make way for these outlandish usurpers, which, tho' on account of their novelty, they may have their admirers, will yet be found in the close to be of *mischievous consequence* to the public, for tho' by means of these foreign intruders, more corn and cattle may be raised than otherwise would be, yet still this is no benefit to the public, when the abundance and plenty shall be found to lower the price, for every one knows that it is more profit to have one bushel of corn which shall bring him five shillings, than to sell two bushels of the same grain for six; because when things are dear, the returns are made with less expence."

It would be difficult I believe to persuade men at present that plenty of corn and cattle could be of *mischievous consequence* to the public, or that the writer who advanced so strange a problem could be in earnest in what he said. It is sufficient for my present purpose, that he admits that these *foreign intruders* have a tendency to make corn and cattle
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plenty; and as it is now near seventy years since this book was written, and that plenty which he foretold has yet been of no *mischievous consequence* to the public, let us hope that the evil day is still at a much greater distance; and that the plentiful production of clover and St. Foin, will only so far operate as to keep corn and cattle from rising to that enormous price at which the ablest writers of the *present times* have positively predicted they would arrive and continue.

Mr. Tull was no friend to clover; he calls it a foul feed for horses; speaks of it as hurtful to corn and cattle, and at best but a precarious dependence for the farmer. Sir Richard Weston, who wrote about a century before Mr. Tull, extolls it as much beyond the truth, as Mr. Tull depreciates it. These gentlemen both wrote their real sentiments; but their local circumstances differed; Sir Richard lived in a deep moist country which clover loves, and Mr. Tull on a light chalky dry soil better adapted for the culture of St. Foin; and hence arose the contrariety.

The only material objection to clover, is that of *bloating*, as it is called, or swelling of *neat* cattle; which it is very apt to do when it is young, if great care is not taken when they are first turned into it in the spring; but as this quality is now universally known, most farmers watch their cattle for the first four or five days, after which it seldom happens that any hurt ensues.

The other objections which Mr. Tull urges, hardly deserve an answer. So far from being a foul feed for horses, that it will keep them in heart without corn, in circumstances in which the same horses with the ordinary hay about London would grow lean; and as to its failure, on which Mr. Tull grounds his charge of a precarious dependance, it is in that respect like every other crop the farmer has to do with, liable to accidents.

St. Foin is undoubtedly a more lasting crop, and for horses, perhaps, a still more hearty food; but it is by no means so nourishing for cows, nor does it produce milk like clover. Both these plants are, however, great improvements, and as they require different soils, and consequently somewhat different culture, they may both be cultivated to great advantage in different situations.

The land that I occupy, is very improper for St. Foin, because as a practical farmer says, *it is notoriously known to refuse all stiff, wet, or fat earths*; but I have no reason to complain of my crops of clover; and I am persuaded, that for great cattle the hay made of it is a most excellent food, and for sheep and lambs, nothing upon earth can exceed the young sprouts. I therefore recommend it from experience, in preference to burnet, or any of the lately extolled grasses, which from the trials that I have made of them, were there no other objections to them, are more choice with regard to soil than clover.

It is the great excellence of clover, that it will thrive in almost any soil; and this is a quality without which none of the cultivated grasses can be said to be a general improvement. Lucern on this account will never become a general improvement in England, because I am certain, whatever others may have said of it, that it will never thrive well but upon deep rich moist ground; rich meadow suits it best, and that whenever an attempt is made to force it in ground that is not rich, the expence of weeding, hoeing, cutting, and dressing, will exceed the profits arising from it. Where it will grow as other grasses do, it is a most valuable improvement; as shall be shewn more at large when I come to speak of that particular plant.

Clover, which is the subject of this chapter, (I mean the broad, of which there needs no description)

tion) requires no particular culture; the same preparation that is made for wheat, barley, oats, or even beans or peas, serves for clover; for among all these, clover has been sown. What requires the greatest attention, is *the seed*; and I am apt to suspect that to bad seed, and to the destructive fly, the miscarriages that happen to clover are chiefly owing.

Most people chuse new seed, because it looks bright and lively. Old seed contracts a brownness and deadness which farmers are apt to dislike; but I am positive, that the seed of a good year when the clover has been well ripened and threshed dry, is much better the second, nay the third year, than seed of a cold dripping summer and wet autumn is the first.

I am not clear, that the brightest seed, in which the yellow predominates is the best, because there is reason to doubt whether the yellow are sufficiently ripened to vegetate generally, and whether it be not to the brown only that we owe our crop; not that I believe the yellow by becoming brown with age, becomes more prolific, but that the well ripened brown seeds of good years, being naturally brown, vegetate more strongly.

By vegetating generally, I do not mean, that no one yellow seed will vegetate; but that the greatest part of them do not, or if they do, do not produce vigorous plants. I am sure all of them do not, and I could wish that others would make trials as well as myself, to determine this matter with greater nicety.

Clover, where it takes, always comes up abundantly too thick, a quart of good seed, therefore, instead of four, sown upon an acre by a good seedsmen, is fully sufficient. Were the seeds contained in that measure to be numbered out singly, they would plant a field of twenty acres; yet it is surprising,

that four quarts are commonly sown, and sometimes more. And though it frequently happens that the plants come up in patches, and that many bare places are seen when the plants are young, yet when they come to spread, all those bare places are filled up and appear thick, which one would think would convince the husbandman, that he needs not be so solicitous to throw away his seed, especially when he buys it, as he sometimes does, at a dear rate.

The best time for sowing clover among barley, is, about the latter end of April, if the barley be then in blade; if it be not, the beginning of May will be time enough; it is by sowing clover too soon that the injury to the barley can happen; for let the season be ever so wet, the clover will not rise after this time, to a height to hurt the corn, nor will its tender fibres, were they not to descend below those of the barley, collect so vigourously as to rob the corn of its nourishment.

My method is, when the green blades of barley have just covered the ground, to sow the clover, and to harrow it in dry. When rain comes it soon vegetates, if the land is in heart; if it is not, it is folly to sow seeds; as I myself have experienced.

It is the custom with some good farmers in the vale, as Mr. Ellis has observed, to sow their clover upon their wheat steaches in February, and perhaps it may be the most eligible method upon strong land, for then the ground being mellowed by the winter frosts, is generally in the finest order to receive the seeds; add to this, that if the weather is fine, the clover will get forward before the fly has strength to consume it, and if it should afterwards suffer by the severity of the weather, the farmer will have time to restore it by another sowing; I have this observation however to make, that if clover when it is sown thus soon, happens to succeed, it is very apt to overtake the
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the wheat, and to rise with it. In like circumstances I was obliged to mow a field of wheat about three years ago, there being as rich a crop of clover among it all finely headed as could grow, and no reapers would undertake to reap the wheat at any price, both the wheat and the clover being nearly of an equal height.

Another inconvenience attends sowing with wheat, and that is, if you delay sowing till the latter season to avoid the above inconvenience, your land is apt to be surface-bound, and if you sow under that circumstance without harrowing, your clover will come up in patches so unequally, that it is odds but that the whole must again be ploughed up.

It is besides a great disadvantage to sow in fteaches, because what comes up in the furrows can never be mowed, and the furrows being a considerable part of every field laid down in fteaches, the crop must, proportionably to the space they occupy, be diminished.

Many good farmers sow clover with oats, which next to barley in ordinary soils, I account the best course; in that case the oats and the clover, contrary to the practice with barley, should be sowed nearly at the same time; otherwise the oats will be apt to check the clover, especially if they happen to prove a full crop.

On the hills where the land is apt to be stoney, gravelly, sandy, or chalky, St. Foin is most undoubtedly preferable to clover; for clover being a quick grower, requires a great deal of moisture, and as it sends down its roots but a moderate depth in the ground to collect it, when the weather proves dry, it must starve for want of a sufficient supply. On the contrary, St. Foin affording but one crop in the summer to the clover's two, less moisture is required; and besides it sends down its roots to an incredible

depth, whenever the fountains above withhold their assistance, so that St. Foin is never at a loss for refreshment in the recesses below.

Next to the season for sowing, the time for cutting of clover is the most critical. If it stands too long the second year before it is once cut, it is apt to spend itself too much, and the second cut will be hurt by it. If it is cut in rainy weather it loses its colour, and will become mouldy. And indeed, if it is not stacked or housed perfectly dry, it is generally spoiled for sale, and it requires some art to make it fit even for the farmer's own use; this art is mixing a handful of salt in a pail of water, and sprinkling the brine over the musty clover with a holly-bush before it is presented in the manger for the horses to eat. With this additional relish, the horses will prefer it to the best hay, and it does not seem to suffer in substance, because they will thrive with it as well as with the sweetest.

In catching weather, when clover is almost made, it is a most ruinous practice to pile it up in cocks, for when a hasty shower comes, it runs through the whole cock, and if this happens in the night, it will surely make it mouldy. Clover should be wind-rowed like oats, turned like oats, and never suffered to lie till it heats in any one place. By this management of keeping it cool and turning it cautiously when a gleam of sunshine dries the uncovered ground, clover may be preserved without damage many days; whereas by cocking it up, you may hurt it in a single night. It is equally pernicious to stack it in rainy weather; for wherever the rain lodges, there the clover will turn mouldy, not that it is in reality much the worse, but yet it will be blown upon at market, and you must either sell it considerably under price, or suffer your own cattle to consume it. On the contrary, if the air proves dry, and the sun
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powerful when your clover is ready to cut, and you have hands in plenty to mow, turn, and wind-row it, you may in this case stack it up, if it be thorough dry, as green as you please; for by laying bavons or straw underneath, and running up a basket in the middle, which is now generally in practice, you will effectually prevent its firing, and by thatching as soon as your rick is pulled and settled, you will fortify it against rain, and defy every injury to which it might otherwise be exposed from a change of weather. Clover should be well covered with straw, the moment it is ricked; for, contrary to common meadow grass, rain passes freely through its substance till it is heated and well settled.

Clover got up in this hasty manner, if no wet comes till after it has heated, will cut green out of the rick two years afterwards, and one hundred of it, if spent the first year, will have as much nourishment as a hundred and a half put up in the usual manner.

Sheep, when the snow and frost set in severely in the winter, will eat the very worst clover; and some people reserve their damaged clover for that purpose.

Many farmers, after having secured their first crop, chuse to let their second crop stand for seed, and nothing pays so well on some lucky occasions. It is, indeed, somewhat hazardous, and thence accrues the profit. If the rains set in about the time of ripening, or what is much the same, the misty dews that continue sometimes without intermission at this time of the year, it is a chance if you can gather your seed; if there be drying winds and days of intermission, and you industriously improve those opportunities, your diligence will be well rewarded by a double, sometimes a treble price to what seed is sold at in common. Thus lucky accidents help to make
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some poor men rich ; but on the other hand, if mis-carriages happen, the poor man is still made poorer by running risks.

The method of saving clover seed is various in various places ; some after mowing, collect the plants into small bundles like little sheaves, and drying them carefully, thresh them in the field upon cleaths contrived for that purpose ; others again, after drying, load the clover home, and lodging it in the barn, thresh it out when it best suits their convenience, as they do other crops. Some who are curious in seeds, when they apprehend a scarcity, feed the clover early in the spring, and then suffer it to remain for seed, by which they run less hazard of a crop, as it ripens before the dews come on, and while the sun has yet power to harden the husks and make the seeds more perfect. The husks are then more ready to shed their seeds than when deferred to the latter season. This, perhaps, may be a good way of getting the seed ; but I prefer for my own use reserving a patch untouched till the seed is ripe, and then there is no danger of finding a dry time to gather it. When the seed is threshed out, if the straw is stacked dry, it will make excellent fodder in the winter for cows or sheep.

Mr. Miller advises to sow clover in August, but waving one great objection to this practice which that gentleman might not foresee ; (namely, that lands in tilth to receive clover at that time, must be in condition likewise to receive wheat, and few farmers, I believe, will give up their wheat crop, for a crop of clover,) there is another of much greater force, and that is, that he seems to be mistaken in the application of his own principle, the justice of which I am ready enough to acknowledge in plants that are natives of any country, or that are naturalized to the climate ; viz. *that the proper time of sowing*

is the precise time of SEEDING. Wheat, the most valuable grain we cultivate, is a proof in favour of this observation. But it is not clear to me, that August is the proper time for clover to shed its seed, though long habit has appropriated that season to that purpose.

Were the rule to be strictly followed in the case before us, the latter end of May, or the beginning of June, would be the proper season for sowing clover; and were the clover to be sown at that season, the latter end of May, or the beginning of June following, would be the time that the first crop of clover would perfect its seed. Whereas, when it is delayed to August, as Mr. Miller directs, the season is then elapsed for the clover to gather strength to resist the winter's chill, and instead of perfecting its seeds in its natural course, by that ill-judged delay, it never, properly speaking, perfects them at all; for as I have elsewhere observed, there is a time allotted by the Great Author of Nature for every thing to follow its course, and when that order is departed from, a degeneracy ensues.

If Mr. Miller's observation be founded in nature, as I see no reason to doubt that it is, it will follow that barley, and oats, and pease, and beans, and the whole tribes of vegetables that perfect their seeds in the summer and in the autumn, should all be sowed or planted in the summer or the autumn, according to their respective times of ripening; yet the universal practice of all ages and all countries is against this hypothesis.

For the credit therefore of English authors, as all of us seem to be involved in the general censure of advancing this doctrine, this matter should be set in a clear light.

The Rev. Mr. Dickson, a writer upon Rustics of no mean account in a neighbouring kingdom, in a chapter

a chapter upon clover, peremptorily asserts, "that
 "almost all the English authors, that treat of this
 "subject, recommend the autumn as the proper
 "season for sowing it;" and adds, that "they are
 "very positive, and complain much of the ignorance
 "and obstinacy of the farmers in continuing the old
 "custom."

That Mr. Miller does this, I readily grant, and perhaps some others after Mr. Miller, but that any practical English farmer ever recommended this practice, I very much doubt. Mr. Dickson's assertion is therefore much too general, and should be cautiously regarded. Mr. Miller calls himself a Botanist, and writes professedly for the instruction of gardeners; when he treats of farming it is collaterally, and his authority, though, perhaps, of much weight in the road of his profession, should be well considered before it is admitted in a profession he does not pretend to understand.

Those who relying upon Mr. Miller's positive directions have sowed their clover in autumn, have met with the same disappointment in England, as Mr. Dickson says those who have tried the same practice in Scotland have complained of. But from my own experience I can aver, that clover sowed the latter end of May in a suitable soil, if not fed-off indiscreetly in the winter, will be ready to feed about the same time the year following. It is, however, very hazardous to sow it about that time, because of the fly; and when it is sown, a good quantity of quick lime should, in a day or two after, be sown over it. By a good quantity, I mean about ten bushels to an acre.

By this management, I do believe that clover might be made to produce four crops as well as two, as the first introducers of it have asserted, that is, by sowing it alone upon a clean well prepared tilth
 in

in June, it would be fit to cut by the latter end of the following May, and again in August. It may then be fed off the following winter, and in the succeeding summer, it may, perhaps, yield one full crop of hay and one of seeds, after which it may be plowed up for wheat, and I make not the least doubt but the wheat will be good.

Though I do not recommend this practice to others, but only throw it out by way of ground for experiment, I shall most certainly try it myself if health remains.

Though the effects of clover are, as I have already observed, generally known and guarded against by all who turn horned cattle into it in the spring, yet as an accident may happen, it is good to be prepared with a remedy. This I find circumstantially related in the *Museum Rusticum*, a work in which many excellent observations abound; and, therefore, shall omit no part that is essential to the cure. The gentleman, who relates the case, had a steer so swelled that he must have died, if a remedy had not been instantly applied. Walking about proved ineffectual; incision was therefore the last resource. The swelling he observed was most remarkable between the ribs and the pin-bone on the near side; he gave the farrier a thin incision knife, round pointed, and made him cut through the hide *about an inch long downwards*, nearly in the middle between the ribs and the loin bone; and then caused him to make another incision into the cavity of the belly, but cautiously, so as not to wound the intestines; this done, though the orifice was no bigger than a pea, the wind rushed out violently, and the swelling abated by degrees; a needle was then passed through the wound in the hide, and the thread tied tight, after which the beast was housed; next day he eat some oats and hay, and in a week the wound was healed, and he was turned out with other cattle.

Another

Another method, which I have been told, is equally effectual and more safe; and that is, by emptying the intestines with the hand, as is sometimes practised upon horses, and which all farriers, and most farmers know. A youth with a moderate hand, by barring his arm to the shoulder, will soon empty a beast's belly.

Prevention, however, is better than cure; cattle should never be put into clover while the dew is upon the grass till seasoned to it, nor suffered to remain above an hour or two in a-day, and that too when their bellies are filled before, nor should they be suffered to stay in it in the time of rain, nor while the clover continues wet; these precautions observed for four or five days, will prevent accidents of this kind, at least, from proving fatal. Some cattle, indeed, are more subject to be affected than others, and upon those an eye should frequently be cast. It is remarkable that horses are never subject to this disorder.

C H A P. XIV.

Of White or Dutch Clover.

THE White or Dutch Clover, is of late among farmers become an article of general cultivation. The Honorable Society of Arts at first found it necessary to revive the culture of this plant by a premium of 20*l.* for sowing the greatest quantity, and another premium of the same value for saving the greatest quantity of the seed; but these premiums have since been discontinued, because farmers are now sensible of its excellency, and want no farther encouragement to incite them to extend the cultivation of it.

Why

Why it has acquired the name of Dutch Clover, I believe no good reason can be assigned. The Dutch indeed, or rather the Flemings seem to have been before-hand with us in discovering the superior excellency of it to other grafs, and have by that priority drawn large fums annually from this country for the seed of it; for though it is but lately that farmers here have begun to value it, yet it has long been purchased by gentlemen for forming lawns, grafs-platts, walks, and other decorations, where turfing was either too expensive or wholly impracticable.

It is now, however, discovered to be a native of this country, and I myself have three acres of it, which are constantly fed, and in one summer maintained 14 porkers and two sows, four cows, and occasionally fix horses, with only the addition of an adjoining orchard, and about two acres and a half of pasture besides.

This field six years ago bore a crop of wheat, but was afterwards neglected, as being by its nearness to the house liable to the ravages of poultry and other casualties.

The following year, though no care was taken of it, I was agreeably surprized to find it covered with a fine flourishing grafs which came naturally, and which upon comparifon, I soon discovered to be the true white clover, for the cultivation of which the Society had just offered their first premium.

Although I had that summer intended to fallow this inclosure, with a view of laying it down with grafs-seeds, in the usual manner, the spring following, yet I was persuaded to suffer it to remain in broad lands as it lay, and to wait the issue.

The event has been, that it has ever since been fed occasionally by all the cattle belonging to the farm both summer and winter; and that it is now so strongly matted, that though the soil is in some parts
springy,

springy, the cattle graze upon it in the wettest seasons without poaching.

This, I think, is an incontestible proof that the white clover is natural to the lands of this country. The soil on which this happened is a sandy loam inclining to clay, and that for a considerable depth. No manure has been laid upon it since it was fallowed for wheat, and then only common yard dung.

Near the Severn side, in Shropshire, I have since seen a like instance which strengthens my opinion, and both together amount with me to a demonstration, that the white clover has as just a claim to the title of English clover, as it possibly can have to that of Dutch.

A four meadow that had been long neglected, and was over-run with all kinds of trumpery, fell by accident into the occupation of a newly established company, who having occasion to improve it, were persuaded to cover it lightly with coal-ashes, of which they had plenty. The first year very little alteration was discoverable, but the second gave them encouragement to repeat the dressing. The third year a surprising alteration ensued; in the winter the four spungy weeds died away, and in the spring a fine sweet swart appeared abounding with white clover, not a plant of which had been known to grow on that spot for many years.

The Rev. Mr. Comber, whose character as a writer is well known, and whose veracity cannot be called in question, has in the *Musæum Rusticum*, reported a similar effect upon a close naturally cold and full of moisture in the county of York. On this close, which that gentleman calls a meadow-close of seven acres, 150 loads of coal ashes were laid; for the two succeeding years no benefit accrued; the third and fourth, the occupier began to see his advantage by the appearance of red clover; in the fifth
and

and sixth years it was almost a bed of red clover, and so it continued where not a pile of that grass had ever been seen. He adds, that he has since experienced red clover to be the reward of manuring a cold clay with coal-ashes even in the year immediately following the spreading of it. These instances, in my opinion, prove incontrovertibly, that both the white and the red clovers are natives of Great Britain, and they are both most excellent food for cattle, and most worthy of cultivation.

Of the latter, I have already said enough; but of the former it may be expected that I should be more particular, as it is not so generally understood as the other.

The white clover however, in some respects has the advantage of the red, and in particular as it is a perennial grass, and is not so choice in the soil on which it will flourish as the red.

In other respects the red has the advantage over the white, particularly in the bulk of the crop, and its superior fitness for hay; there is besides a convenience attending the cropping it in course with other crops.

But the white clover, where sheep are kept for breeding, has no equal, for as it is a constant grower, yet never rises to any considerable height; it overspreads the ground in such a manner as to kill every other fibrous vegetable, except those that by their bulk are found to resist its attacks, and it has this additional excellence, that the closer it is bitten, and the barer it is fed down, the more vigorous it grows; so that two or three inclosures of this grass of five or six acres each, will maintain more sheep summer and winter, than an hundred acres of the best downs.

It has been, and still continues to be the common method in this country to lay down inclosures designed for pasturage, by the mixture of two grasses, red,

or

or sometimes white clover, and common grafs seeds. This method, where the farmer has in view an early crop of lay, and pasture for his cattle the rest of the year, may do well enough for two or three years; but if the inclosures so laid down, do not naturally incline to grafs, this course will soon run out, and his grafs lands must be broken up a-fresh, and converted again to arable, or they will not answer to pay rent; whereas inclosures laid down with white clover alone will continue for ever, if the soil is natural to it, unless the farmer's convenience should require that they should be broken up; and in that case, a crop of seed may be saved the year before breaking up, that will liberally pay for the additional expence of changing the species.

There is no particular culture necessary for the propagation of this grafs; nor does it require any particular dressing; coal-ashes, foot, malt-dust, or any of the top-dressings, lime only excepted, may be necessary sometimes after a severe winter by way of warming and refreshing the cold land on which it thrives the best; but for my own part, on the spot I mention, I have never found it necessary to lay a cart-full of any kind of manure whatever; and I have observed that the swart has thickened every year. Surely if this be true, and the writer of this has no motive for asserting a falsity, such a grafs as this, of which cattle seem very fond, is better worth the farmer's attention, than lucern, or burnet, or timothy grafs, or any of the lately cried-up artificial grasses that require so much more care and pains in the management and culture.

The inclosures that are laid down with this grafs should not be large, for as it is much better adapted for pasture than for hay, cattle love change, and by shifting them from field to field, young sweet grafs will spring up a-fresh in one inclosure, while another

is

is feeding off; so that a constant succession of fine rich food may be supplied, by only observing the rotation in which the inclosures are stocked.

I have already said, that white clover is less nice in its choice of soil than the red, tho' the red is the least of all *the other* artificial grasses. If the white is sowed at the proper season, which is in March or April, there is no soil that is properly prepared for the reception of seed, that it will not take root and grow upon; this excellent quality makes it so desirable for lawns, grass-platts, walks, &c. that on some soils, and in some circumstances it is found preferable to turfing.

If the land has been previously stirred to a proper depth, no matter how shallow this last plowing is performed, as the shallower the plow goes, the fewer of the seeds of weeds will be put in motion; but as soon as plowed the ground should be well harrowed down, and in that condition left till a shower falls, immediately after which the seeds should be sown, lightly bush-harrowed, and then rolled.

Those who would propagate this grass in perfection, than which there is not a more valuable kind in this or any other country, should winter fallow the inclosures intended to be laid down with it, should plow them early in the spring, and cross plow them as soon as the weeds begin to appear. After that operation has been performed ten or fifteen days, the whole should be harrowed smooth, and then rolled, and in that condition it should remain till the weeds again begin to shew themselves. Then take the first opportunity of dry weather to plow for sowing.

C H A P. XV.

Of St. Foin.

THIS is Mr. Tull's favourite plant, and he has taken more pains to improve and recommend the cultivation of it than any other vegetable, wheat only excepted. So far as my experience has justified his observations, I shall accompany him; where I have been misled by following his directions, there I shall depart, and warn my readers against a like miscarriage.

It is not to be wondered that he should prefer drilling of St. Foin to every other method of planting it; but I do not find that he introduced the horse-hoe generally, into the culture of it. He is very curious about the seed, and suspects most miscarriages to be owing to defects in that article. The better it has escaped the wet in the field, the sooner, he says, it will spoil in the barn by heating. If it be sacked never so dry it will heat, and if it heats it never recovers. Seed should therefore be tried before it is sown, by selecting an hundred or two of the grains, sowing them before hand, and remarking how many sprouts and how many rots. The signs of good seeds are, first, the husk of a bright colour; second, the kernel plump; third, the outside of a light grey inclining to blue, or of a shining black; and fourth, the inside of a greenish fresh colour, which last is the most certain and infallible sign of all.

Being secured of good seed, your land should be well prepared, well cleansed from weeds, and well pulverized; St. Foin may be sowed with barley, oats, or other grain; but it were better to be sowed alone early in the spring, because if the grain with which it is sowed should lodge, it would kill the young St. Foin.

Foin. The quantity of seed should be in proportion to the quantity of nourishment ; but as that is not easily to be known, it were better to hoe out the overplus, than to suffer by want of seed. In the common way, from four to seven bushels upon an acre. In the new husbandry from two to seven gallons.

Any dry ground may be made to produce St. Foin, but that which is naturally the richest will produce the best crops.

St. Foin is principally cultivated in the hill countries ; the vallies being generally clay-bottomed, retain the wet too much, chill the roots, and perish them for want of heat.

St. Foin never wants moisture, for when the surface is parched, it gathers its nourishment from below, and in the driest seasons it always appears most flourishing.

St. Foin cannot be planted too thin, for where the plants are six or eight inches a-part, there the crops are always the best.

If St. Foin is to be horse-hoed, it should be planted in double rows, with eight-inch partitions, and thirty-inch intervals ; if hand-hoed, in single rows, sixteen inches asunder, and all the plants eight inches a-part in the rows, contriving to leave the master plants ; if not to be hoed at all, in rows eight inches a-part, and the plants as equidistant as possible.

St. Foin in the common method, should be hand-hoed like turneps. St. Foin hand-hoed will grow much quicker and larger than the same plant unhoed ; and Saint Foin horse-hoed will grow as large again as that which is hand-hoed.

If St. Foin is kept clean, it will in two or three years cover the ground, tho' perhaps the first year's crop was scarce worth mowing. This, however, as I apprehend, does not arise from the number of new

shoots from the old plants, but from the number of new plants from the shattered seeds, as I have observed experimentally.

St. Foin should not be covered more than half an inch deep when planted; nor should sheep be permitted to graze upon it till after it is cut the second year; and then only between the time of cutting and All-Hallowtide. As St. Foin is never planted by good husbandmen on wet land, there is no danger from poaching.

One acre of drilled St. Foin, is, generally speaking, worth two of sown St. Foin upon the same land; it thrives better, lasts longer, and yields a greater quantity of seed; but this must be understood where it is hoed and kept clean. Where drilled St. Foin is totally neglected, the weeds in the intervals grow so thick and rank, that they choke the St. Foin, as every one will find who tries the experiment. And St. Foin sown in the common way upon land that is proper for it, if hoed, and kept clean for the first two years, will thrive as well as the drilled, as Mr. Pull acknowledges.

St. Foin has many advantages over meadow or common grass from its elevated situation; the dry healthy soil on which it thrives; the depth of its roots; and the conveniency of making it in almost any weather, except incessant rains. On the hills the winds dry more in one hour, than in the vales in a whole day; the sun too has more power to dispel the dews, and dry up the damp, and the plants themselves are less susceptible of injury from wet, than any other kind of hay.

Those who are curious in St. Foin, distinguish the several sorts of it by the following terms; first, the *virgin*; second, the *blissomed*; third, the *full-grown*, and fourth, the *threshed*.

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The first, Mr. Tull says, is the best beyond comparison, and, except the lucern, has not its equal in the world. This must be cut just before the blossoms appear.—An accident that happened to Mr. Tull's St. Foin, fully confirms what I have said of clover, that provided it be stacked dry, no matter how green it is stacked. A quantity of Mr. Tull's virgin St. Foin being carried for fear of rain, was put up so green, that out of the largest stalks one might wring the milky juices, yet by stacking it in little ricks and drawing up a large chaff basket in the middle of each, its fireing was prevented, and it proved the best hay he ever had. It kept a team of horses fat throughout the year without corn; and when tried with beans and oats mixed with chaff, they refused the corn, preferring the hay.—This hay, adds Mr. Tull, the owner, if he is wise, will not sell at any common price; but endeavour to have some of it every year, if possible, for his own use.

The second sort of St. Foin-hay, is that cut in the flower, and tho' much inferior to the virgin, it far exceeds the ordinary kind commonly propagated. This is that St. Foin which is commonly sold, and the larger it is, the more nourishing for horses.

The third sort, which is the *full-grown*, is cut when the flowers are gone or going off. This makes the largest crop, but the worst St. Foin Hay, tho' good in comparison of other grasses.

By these divisions the farmer has three chances of making his St. Foin-hay, to one of any other sort; all of them nearly alike advantageous; if the *first* proves favourable, the loss of the quantity is overbalanced by the gain of the quality; if the second, both quantity and quality combine to enhance the farmer's gains; and if only the third is obtained, then the increased quantity makes amends for defect in quality.

As to the manner of making St. Foin-hay, Mr. Tull, in my opinion, refines too much ; and tho' his philosophy may be admitted, yet his inferences are by no means solid. He advises, and that very judiciously, to turn the swaths, as soon as they are dry on the upper side, and again to make them into little cocks as soon as they are dry on the other ; and his reason for this is, that a less part of the hay will be exposed to the injuries of the night, than when in the swath. Dew, says he, being of a nitrous penetrating nature, enters the pores of those plants it reaches, and during the night possesses the room from whence some of the juices are dried out ; thus it intimately mixes with the remaining sap, and when the dew is again exhaled, it carries up most of the vegetable spirits along with it, which might have been fixed had they not been taken away in that subtle vehicle. To confirm this theory, he adds, that if St. Foin be spread very thin upon the ground, and so remain for a week in hot weather, the sun and dew will exhaust all its juices, and leave it no more virtue than there is in straw. All this is very plausible, and I believe very just ; but in this latter respect St. Foin shares only in common with every other vegetable. If vegetables of whatever kind are exposed to the action of the sun till all their juices are dried out, they become then less nutritive as well as less grateful to the taste of those animals that are to feed upon them, and this every body knows ; but that St. Foin should for that reason be made up in cocks as soon as dried, does not seem to me to follow as a natural consequence, and whoever proceeds so to do, will one time or other be a great sufferer. Mr. Tull allows, that St. Foin lies much more light and hollow than common hay, and for that reason advises, if the weather be doubtful, not to spread out the cocks, but to enlarge them by shaking several of them into one. In this,
which

which is a most material article, I wholly differ from Mr. Tull, and it is from experience that I ground my dissent. In the making of St. Foin, lucern, clover, and all the stubborn grasses, whose stalks, being less flexible than common hay, will not suffer them to unite in so compact a manner as to resist rain, my advice is never to cock them at all, but to turn them attentively as they dry in the swath, and so to continue to do, if the weather be dry, and the sun powerful, till every appearance of wet on the outside is totally absorbed. When that is accomplished, as it will be with care in three or four days in drying weather, then run the whole up into win-rows for carrying, provided the weather is likely to continue till you can stack it, and employ every hand that can be procured to forward that operation; for upon that, after all the care, pains, and expence you have been at, depends the goodness of your hay. It is therefore absolutely necessary that you bottom your rick with dry havins covered lightly with straw, and if it be large, it will be necessary to form tunnels at every six feet space, exactly in the middle line of your rick for the admission of air, to prevent firing, and by this precaution should the stems be so green, as Mr. Tull says, that milk may be pressed from them, yet your hay will be so far from being hurt by that circumstance, that in respect of nourishment, it will be incomparably the better.

In doubtful weather, should you throw your St. Foin, &c. into large cocks, and if rain should fall, you must infallibly open and spread out every cock as soon as it is fair, for if your cocks were as big as ricks, a heavy shower would run through them from top to bottom, and wherever the rain lodged, there your hay would contract a must, unless spread open and dried immediately; for the admission of wet being an enemy to the free admission of air, wherever

the first lodges, the second will be excluded, at least so far as not to have power sufficient to absorb the moisture. I need not enlarge upon this obvious truth; but it leads me to suggest another caution equally necessary, and that is, to thatch your ricks as soon as made; at least to cover them loosely with straw laid on like thatch to carry off the rain, if any should happen to fall before they are sufficiently settled, or have had time to heat. If this precaution is neglected, you can never be secure of sweet artificial hay, tho' the very reverse is the true way of managing natural grasses.

The seed crop, or threshed hay, is next to be considered. This indeed is seldom much attended to, till the St. Foin is almost worn out, as farmers think the future growth of the St. Foin is weakened by the exertion of all its powers in the action of continuing its species. It is therefore only when they want to break up their St. Foin, or when the wetness of the season forces them to it, that they suffer their St. Foin to run to seed. In these cases great care is necessary in order to procure and preserve the seed in perfection.

The best time of cutting is in moist weather, provided the seed be ripe; but as that seldom happens all at once, and the first blown is generally ripe before the last blown begins to fill, the farmer can very seldom avail himself of the whole crop, and therefore it were better to seize the first opportunity of the weather after the lower ears are ripe, than to run the hazard of it till all are filled, and the rather as the lowermost husks contain the prime of the seed, and the highernmost seldom or ever arrive at perfection.

To know when the seeds are ripe, you must examine the husks; if they are of a brown colour, and the kernal full and firm within them, and when it is opened will cleave in two like a full grown pea, then they are in perfection, and then the St. Foin should be cut.

If

If St. Foin is suffered to stand too long, the seed will naturally shed with the first gale of wind that blows; but if it is cut green, provided the grains are full, it will ripen, or rather harden after cutting, and be as good in every respect, as if it had remained till it had been what is commonly called *dead ripe*.

After the St. Foin is cut for seed, it should not be stirred like that cut for hay, but should be turned gently night and morning, while the dews and damps are yet perceivable; and in that tender manner should be dried gradually. When the moisture is sufficiently exhale, and it may be inconvenient to thresh it in the field, it should be put together in cocks, (for here it must be noted that rain will be so far from injuring the seed, that were it to be exposed to a week's rain in the straw, the seed would thereby be benefited, as it would afterwards be in no danger) and carefully put up in waggons, the insides of which should be covered all over with sheets or cloaths, for saving the shattered seed, which is always the best, and in general comes forth in pretty large quantities. When it is once well housed it is then safe, except from vermin; but these are very fond of it, preferring it to corn, perhaps for its greater sweetness.

Another manner of gathering this seed, is, by threshing it in the field; but this can only be done when the sun is powerful, and when there is plenty of hands at leisure to perform it. The method is to level a convenient spot, and to harden it by treading, and then spreading a large sheet smoothly every way, they peg it down by the four corners for two men to thresh upon; this done, two other men supply the threshers by means of grasping forks, till all is threshed within a certain distance; and then with a small sheet they bring in that which is more remote, till the threshing sheet is filled with seed.

As

As fast as it threshed, there is a fifth person to remove the hay, and a sixth to tread it down, till it rises to a little rick; and when the great sheet is full of seed, they riddle it, and put it up in sacks till they have time to clean it in the barn, in a more perfect manner. When they have cleared in this manner a certain space, they remove the main sheet, and proceed as before. But all this must be done with the greatest expedition, and the hay must either be stacked or housed before rain; or it will suffer considerably.

But there is still more nicety required in the curing the seed after it is thus threshed and put up; for if it be immediately winnowed, and a single bushel left in a heap, or put into a sack, it will in a few days heat and ferment to such a degree, that the greatest part of it will lose its vegetative quality; to prevent which, they generally spread it thin upon floors, turn it often, and expose it to the free air till the heating is over; but after all, Mr. Tull says, that it will never keep its colour so bright as that which is well housed, well dried, and threshed in the winter. The only way, he adds, to equal this, is by laying a layer of clean dry wheat straw at bottom, and then a thin layer of the seed, and so layer upon layer alternately till you have piled the heap as high as you can reach, avoiding treading upon it to press it down; but when you have more seed to cure than one pile will contain, begin another, by this means the seed mixing with the straw will be kept cool, and come out in the spring with as green a colour as when it was put in, and not one seed in a thousand will fail to grow when planted.

This seed will feed poultry, hogs, and may even be given to horses instead of corn, when the demand for sowing it ceases.

Another

Another thing peculiar to St. Foin, is, that it will vegetate in the spring, although the crown of it be eaten off by cattle in the winter, or what is still more extraordinary, even if it be cut in two with the spade, and the earth and crown thrown aside together; yet notwithstanding this, if sheep be suffered to remain too long upon it, and to eat off the second buds that succeed to the first amputation, the plant will then decay and perish without any farther effect. Sheep therefore, should never be suffered to remain longer upon St. Foin, than just to eat it bare in the winter; not to be folded upon it, nor to graze it again in the spring.

St. Foin never impoverishes any land; on the contrary, it enriches wherever it prospers. Poor land, being broken up after St. Foin, has produced luxuriant crops of corn without dung; but it must be observed, that such land should not be broken up in the spring for immediate sowing. The internal heat, if I may so call it, occasioned by the fermentation of the corrupting swart, added to the external heat of the approaching sun, acts too powerfully upon the tender roots, and destroys that due proportion of heat and moisture, that is necessary to the production and growth of all plants. If this observation be just, the leys of all artificial grasses should be broken up in autumn, that the swart may be rotted before spring: And if the land be in heart, and it is the farmer's humour to have a crop of corn succeed without intermission, wheat appears to me to be the most proper grain for that purpose; but if the land be poor, and the future improvement of his crops is in view; the readiest and most effectual way to bring his land into tilth, is to plow it in the winter, repeat that plowing in the spring, and continue stirring it till the season for turneps arrives; then it is that he should begin cropping, and if his turneps escape the fly,

fly, and he hoes them well, and feeds them off with sheep, his land will then be in excellent order for summer corn, and for a long succession of other seeds.

Nothing discredits the art of husbandry so much, or sooner impoverishes the undertakers, than the ridiculous custom of forcing land beyond its natural powers. Could we have patience when land is exhausted of its artificial pasture, till by proper dressings and management it received a supply; we should then seldom be disappointed in our expectations of a plentiful produce to reward our toil. But if it be expected that the earth should of herself continue to pour forth her treasures upon us, whenever our unreasonable avarice should demand them; or, that being willing to yield us a nettle, we should require a rose; in cases like these, disappointment is the certain and indubitable punishment of our own folly, and as naturally follows it, as the falling of the leaves succeeds the recess of the sun.

But to return: The profit of *St. Foin*, like that of every other grass, has been magnified beyond the truth. In order to introduce any new article into husbandry, it is not thought sufficient to represent it as partaking of all the excellencies of other vegetables of the like kind; but it must be said to possess more. With a view to bring clover into repute, hear what the old writers say: "Clover seed thrives best in the worst ground. Heath ground pared and burnt, and lime mixed with the ashes spread over it, if plowed four inches deep, will yield you three crops e'er the year be done; all of them very good hay. You may then feed the ground with cattle all the winter, as in other pasture. If you intend to preserve seed, then you must expect but two crops that year. The first will be ready to cut about the beginning of June, the second must stand till the seed of it be come to a full and dead ripeness, and then must you cut it and thresh

thresh the tops; you will have at least five bushels of seed upon every acre. That year you must cut it no more; but as it springs again feed it with cattle. One acre of it will feed you as many cows, as six ordinary acres, and you will find your milk much richer. Being once sowed, it will last five years, and then being plowed it will yield three or four years together, rich crops of wheat; and after that a crop of oats. And as the oats begin to come up, then sow it with clover seed (which is in itself an excellent manure) for you need not bestow any new dressing upon the ground, and by that time you have cut your oats, you will find a delicate grass grow up underneath, upon which, if you please, you may graze with your cattle all that year, and the next take your crops as before."

The Book from whence the above was extracted, was printed in 1670, just 100 years ago; and it is remarkable, that in *Markham's Farewell to Husbandry*, printed about two years earlier, the name of clover is not once mentioned, though that writer had many opportunities of recommending it, had the culture of it been then commonly known.

As the excellence of clover, though very great, is in the above quotation much exaggerated, what is here said, is only to guard the reader against the extravagant encomiums generally bestowed upon new intruders, without any design however to discourage their admittance; for tho' clover did not come up to all that was said of it by those who first introduced it; yet it must be acknowledged, that it has added more to the value of lands in England, than all the other improvements that agriculture has received in many centuries.

To St. Foin, however, Mr. Tull has given the preference: But St. Foin is by no means so general as clover, nor ever can; for as St. Foin can never be made

made to thrive on clay lands, and as at least three parts in four of the arable lands in England are clay lands, it is contrary to the common understanding of mankind, to suppose that what can only be partially propagated, should take place of that which may be generally so. Let us attend to the character of St. Foin as collected from Mr. Tull.

It will make a *forty times* greater increase than the natural turf, by reason of the prodigious length of its tap-root, which is said to descend 20 or 30 feet.—Though poor land and ill management causes it to yield but one mowing crop a-year, yet it has yielded two great ones in rich sandy lands, even when sown in the common ordinary manner.—A large single cultivated plant will weigh more than half a pound, an hundred and twelve only of such upon a square perch, amount to four ton upon an acre.—There has scarce been an exotic brought to England in this or the last age, capable of making a greater or more general improvement *were it duly cultivated*.—The profit of St. Foin fields, either for hay or for seeds, is greatly above that of natural meadows; if meadow hay cannot be cut in its season, it is of little use but for dung; but if the weather will not permit St. Foin to be cut before blossoming we may wait till it is in flower; if still improper, we may stay till the blossoms are off; and if it should then rain on, it may stand for seed.—Rich well cultivated land will have two or three ton of Virgin Hay to an acre, and spring again for a second crop.—The second inferior sort of St. Foin Hay far exceeds any other kind, as yet commonly propagated in England.—Three bushels of good St. Foin Seed given to horses will nourish them as much as four bushels of oats.—Threshed St. Foin Hay has been found more nourishing to horses than course water-meadow hay; and when cut by an engine is much better than chaff
of

of corn.—Five quarters of St. Foin seed has been gathered from an acre in the common way.—St. Foin is much more profitable than clover.—It is observed to enrich whatever ground it is planted upon.—Poor, slate when it has born St. Foin six or seven years; being plowed and well tilled, produces three crops of corn, and then St. Foin again.—Rich arable land was planted with it, and after seven years being plowed up, continued many years so rich, that instead of dunging or fallowing, they were forced to sow wheat upon barley stubble, and to feed the wheat with sheep in the spring to prevent its being too luxuriant.—Many estates have been much improved by St. Foin; the first in England was one of about 140 l. a-year, which sown with St. Foin was sold for 14000 l. Another of 20 l. a-year, was let for 110 l. a-year, and being sown with St. Foin proved a good bargain. These estates consisted of thin slatey land, which before being planted with St. Foin was valued at two shillings an acre, and some of it at one.

The reader has here the whole management of St. Foin, from the greatest master that ever cultivated it. If you should find his character of it not fully verified, you must blame your own want of skill in cultivating it; for Mr. Tull was so good a man, that he would not tell a lye.

C H A P. XVI.

Of Lucern.

THough Mr. Tull extols this plant above all others, yet he despairs of its ever succeeding in England by the ordinary method of culture. When ever the earth begins to be turfy and hard, the Lucern plants begin to perish, and in proportion as the natural grass increases, the crop of Lucern dwindles and

and dies away. It is, therefore, by the New Husbandry alone, according to this gentleman's prediction, that Lucern can be cultivated to advantage in this country; but by the New Husbandry it may be brought to greater perfection here than in any other part of the world.

In Italy, he says, that superstition has chased it from the Roman territories; there *Medica*, for that is the Latin name, was formerly held in such high veneration, that iron must not touch the place where on it grew. The ancient Romans cultivated it at a vast expence; but now so little of it is planted beyond the Alps, that a single acre of it is hardly to be seen.

In the south of France it makes a great improvement, and is there sown in March and at Michaelmas, as clover is here. There the summers are much drier than they are in Italy; the sun parches up the natural grass, and the Lucern lives years without being robbed. When it is in its perfection, the planters have in kindly seasons ten tons upon an acre; but even there it preserves its vigour but a few years; when the natural grass comes, as it will do in time, that goes, and the people know no other way to recover it but by plowing it up and replanting it.

In the more northern climates, where frequent rains promote the vigorous vegetation of natural grass, the growth of Lucern is checked by its luxuriance, and in the neighbourhood of Paris they have plowed it up, and planted St. Foin in its room.

In the rich lands of England the grass comes still sooner to a turf than in any part of France; it were, therefore, in vain to hope that Lucern should succeed generally in a climate where more rain and less sun increase its greatest enemies; in short, it may from all experience be concluded, that every soil in this island is too rich or too poor, too hot or too cold

cold for the Lucern improvement by the common husbandry. Mr. Tull adds, that Lucern was never known to flourish above three years in any ground in which it was sown in the ordinary way.

Though this may be strictly true, as far as came to the writer's knowledge, yet there may be some particular spots so happily circumstanced for the improvement of Lucern, that the soil may in some sense be said to be natural to it, and it may there flourish for many years. There is in my neighbourhood one such spot, on which it has flourished about four years, and is likely to continue a much greater number.

In my opinion, Mr. Tull, misled by the soils in which he remarked it flourished best abroad, recommended such soils as most proper here, which experience has shewn to be the least adapted to the growth of it. Hot gravel or very rich dry sand do not suit Lucern in this country; on the contrary, the fine, rich, black mould, deep and rich dry meadow, or the sunny sides of dry, rich, loamy hills, with the under stratum of warm, stoney, or stately marle are the soils that promise fairest for the improvement of Lucern. That Lucern will grow with all the care and culture of the New Husbandry on any other well manured soil, as the incomparable author of the Essay on Husbandry has asserted, I readily admit; but the year in which that care and culture is remitted in these ordinary soils, will be the last that Lucern will reward the planter's trouble. It is a puny plant where nature does not bestow her favours upon it in profusion. In other circumstances, being unable to support itself, it pines away and perishes.

Mr. Tull allows, that in hot countries it grows best near rivers; and, indeed, in this country I never saw any so flourishing as on the banks of the Severn,
and

and in a meadow near Dartford in Kent, at which last place it bears great crops in the common husbandry:

The best season of planting it in England, according to Mr. Tull, is early in the spring, but the season hitherto the New Husbandry. In the common husbandry the latter end of March, all April, and the beginning of May I have found, by repeated trials, to be very proper seasons. It is a small seed, and easily separated; so that two or three pounds of it is fully sufficient for an acre. Gentlemen, informed by their seedmen, generally sow treble that quantity; but the thinner it is sown the better it thrives.

I have found experimentally, that natural grass is a mortal enemy to Lucern; for having transplanted a number of plants, near my house, upon a piece of ground well trenched in the winter, and cleared from weeds by a summer's fallow, and the soil not perfectly agreeing with it; though by constant hoeing, weeding, and sometimes digging between the rows, many of the plants grew large and flourished abundantly, yet as they grew unequally, and some of the plants failed, which I several times attempted in vain to restore, finding the cost much more than the profit, to force a growth, as it were, in opposition to nature, and having fully gratified my curiosity; after three years culture, I suffered this last summer the cattle to graze upon the Lucern, the weeds to grow, and the turf to fill the intervals; and at this present time November 16, 1769, there is scarce a blade of it to be seen.

It were unjust, however, not to relate all the circumstances. The ground is of a hard-binding nature, very apt to cake or form a kind of crust upon the surface immediately after rain, though fresh dug with the spade; the soil is of a dark brown colour, intermixed in some places with gravel, and was well cultivated upon the Tullian principles; but no dung
or

of dressing whatever, except now and then a few wood-ashes sprinkled along the rows. The rows were fourteen inches apart; and the plants were at six inches distance in the rows. The extent of the whole plantation was little more than half an acre.

As the soil in this small spot differed considerably, I had an opportunity of observing the effect of that difference upon the plants, perhaps as much as if acres of it had been so ordered.

Where the ground was good, and retained its moisture, there the plants grew large and of a deep green colour; where the soil began to harden the plants grew of a paler green, and the leaves were spotted with sickly jaundice-coloured spots. Where it was very hard, there the plants failed throughout the rows for three or four feet together, and those that remained were weak, their stalks slender, and their number few in comparison of those on the better soil, yet they grew as high as the best, and vegetated as often.

Next to these, I transplanted some rows of St. Foin, exactly in the same manner with the Lucern; one of these rows of about forty yards in length, on which the principal care was bestowed, produced more than a bushel of seed. It was a perfect row without the failure of a plant; some master plants there were that seemed more like a bush than a plant, and fully convinced me that transplanted St. Foin would succeed much better in soils like mine than transplanted Lucern. The failure of the latter has, however, occasioned the neglect of the former, and I have now under consideration some farther experiments, that, when the land has received a good dressing, are to be made upon the same spot.

Mr. Tull advises those who would make trials of his husbandry upon Lucern to begin with rows at 13 inches distance from each other, and to keep

them perfectly clean by first plowing the earth away from the plants, and throwing it into the middle of the intervals; then by crossing the rows with harrows or other instruments, and pulling the earth and weeds from between the plants, to lay the roots in a manner bare. This done, they are to pass the plough up the middle of the intervals, and to throw the earth to the roots, and so let it remain till after the next cutting, when this operation, if needful, is again to be repeated. The rankness of the weeds, and the condition of the ground, must determine when, and how often, this is to be done; and, indeed, were it as easy to do it, as it is to order it to be done, it would certainly have a very good effect; but I apprehend from the horses walking up and down the narrow intervals, and then a cross the rows with the harrows, that many of the plants must be great sufferers, as well by the horses treading as by the plough, the harrows, and the men's feet; and that by frequent repetitions, the plants must be so diminished that a full crop cannot be expected; add to this, the natural decay of the plants in the rows, which will happen let the ground be ever so good. These are certainly strong objections to this Husbandry, and they have had their weight; for in the *Masium Rusticum*, I find a practice totally different, strongly recommended.

The writer grounds his instructions upon the practice of Mr. Roque, who by the way was but a very superficial husbandman, yet the directions here given appear not to be wholly destitute of merit. The land, says this gentleman, should be prepared in the same manner as for barley; and, if it were to be trench-plowed so much the better. This trench-plowing is generally practised upon new broken up ground, where one plough goes before another; the first turns the swarth down by a shallow furrow, the other

other plows as deep as the mould will allow, and throws it up a-top of the other; by which operation the turf and weeds are buried deep, and the clear fine mould raised for the seeds to grow in. This is generally performed in autumn, that the turf and weeds may rot in the winter. In February a common plowing stirs the stale tilth, and destroys what weeds the winter may have produced; and before the third and last plowing the writer advises the ground to be manured, not with old rotten dung, but with fresh stable dung that has been thrown up about three or four weeks in the mitchken to heat and ferment; in which warm condition it should be laid upon the land designed for Lucern, and plowed in as soon as possible to prevent the salts of the dung from evaporating; the land should be harrowed and sowed in the broad-cast way, harrowed again with a light or bush harrow, and lastly rolled. From the beginning of March to the end of May, the planter may chuse his season for sowing, and fourteen pounds of seed is the quantity allotted for an acre; which, by the way, is ten pounds too much.

Though this writer advises trench-plowing, and I have above described the usual manner of performing it, yet he cautions against sowing Lucern upon fresh broken up ground; it must be tilled a year or two; pease or beans for one year; but above all, potatoes excel for sweetening and mellowing land; the next season a fallow for turneps, and when the turneps are fed off with sheep, then it is that he advises to prepare for Lucern; in which however, for every other plant, there would be this inconsistency, that if trench-plowing were to be practised after feeding off with sheep, the benefit from the sheep would be totally buried; but, perhaps, for Lucern, as the roots shoo deep, and the warm dung may be sufficient to cause the seeds to vegetate powerfully, the method here directed may be the most proper.

When the plants are one year old it will be proper, with a large harrow to go over your land as often as may be sufficient to root up annual weeds and grass. The harrow, if the tines be rounded, will not hurt the Lucern, the roots of it being very large and tough. This should be done early in the spring, before the roots begin to bud, and if any patches have failed, these should be supplied with fresh seed; a dressing with rotten dug is advised to be laid on at the same time; but surely this must be premature the first spring after such a dressing, as before directed.

The second spring it will be proper to plow the ground with a round share, without either fin or feather, and without a coulter; and in this manner it should lie rough a few days to dry and mellow, then in fine weather to be harrowed down and laid smooth.

One not used to the culture of lucern may be apt to think, that plowing will destroy the lucern, but that it will not, the reader is referred to the practice of Mr. Roque.

This spring-plowing must be annually repeated, and the application of rotten dung must not be neglected; if this last is laid on before winter, it will greatly add to the vigour of the plants.

To make hay of lucern, it should be mowed, according to this writer, as soon as the bloom appears, or before; but as this has been already directed, it will be needless to repeat it; it may, however, be of use to observe, that if seed is to be saved, the second crop is the best for that purpose; and that the lucern should not afterwards be cut that season.

A real planter of lucern, however, has in the same work laid before the public, his own method of practice, against which there appears to me but one objection, which I shall mention after having transcribed his process.

The

The land, says this gentleman, in which lucern should be planted, should be a flexible loam, dry, deep, and rich, either by nature, or made so by art, not but that it will succeed to admiration, should a quarry be underneath. It should be well pulverized by plough and harrow, laid as level as possible, and cleared of weeds. When the land is in this condition, let a small plough with a double mould-board run up and down the field at every three feet upon the flat surface, this will compleatly form three feet ridges. If drill-harrows be not at hand, let the crown of every ridge be raked clean and smooth, and a row of seed planted upon each; it must be planted very thin, about half an inch deep, and covered lightly. From the middle of April to the beginning of May, is the proper season. Thus it may remain till weeds begin to appear, when the hoe-plough, or a small one should take away every alternate side of the ridges, as near the lucern as can be with safety. In three or four days return this earth again to the ridges, and then proceed to take off the other sides, and return the earth as before. If the ground be proper and in good condition, a crop may be expected in July. In September it will be fit to cut again if the hoeing be repeated and the weeds suppressed. After the second cutting, send in the plough and take off the sides of the ridges, and let them so remain till February, when the mould should be again returned to every ridge. In May the grass will be ready for cutting, and will continue to afford a crop every month during the summer, provided the hoeing is duly performed *when the ground is dry* every time the weeds begin to appear.

The only objection which I have to this method, is the difficulty of mowing the ridges, and of preventing the rain from washing them down; if upon trial, no inconveniencies have been suffered on these

acres, the method is certainly good, because easily performed, a common plough as well as a double-furrowed plough will form ridges, and every small hand plough will hoe between them; the method is easy, and therefore commendable because practicable, and it has this additional advantage over every other, that it deepens the soil for the lucern to root in.

Somewhat different from this, is Mr. Miller's direction for cultivating this plant. He advises to sow it thin in drills at eighteen inches distance, and not to cut it but once the first season; but to feed it with sheep during the winter following, and to hoe it and keep it clean. Whoever intends to cultivate lucern, must determine to keep it clean from weeds; and whether in the old or new husbandry, the ground should some way or other be kept loose about the plants, or they will not flourish long.

I come now to lay before the reader, the particular directions of the most elaborate, nice, and elegant writer that has yet professedly treated of the subject: The method of management, which he recommends, is first, to prepare a proper spot for raising from seed, a sufficient number of plants for transplantation; sixteen perches to an acre he thinks quite sufficient, and I think less than half the quantity enough. This should be well dunged, cleansed, and pulverized during the winter, and if deeply trenched and exposed to the action of the air and frosts, the labour will be well bestowed. In the beginning of April he proposes to sow the seeds, in order to procure plants for transplantation the August following; but he adds, that seeds may be sown till the latter end of June for the same purpose the spring following; four ounces of seed to a perch is the exact quantity he directs, but four ounces to a perch, or 40lb. to an acre, must surely be a preposterous quantity, and these

these, the writer says, must be lightly covered, raked, and sparingly watered.

Being thus provided with a nursery for plants, you are next to direct your attention to the field in which you design to raise your crop; and this too, like the former, must be well dunged, cleansed, deeply and nicely plowed, the weeds killed by a summer fallow, and the ground made fine and level by every method the cultivator can devise for that purpose.

About the middle of August he fixes for the proper time of transplantation, against which time the ground must be fresh stirred; a number of hands provided in proportion to the number of acres intended to be planted, for no time must be lost in that operation.

All things thus prepared, your young plants must be carefully loosened with some proper instrument, (a strong three tined fork is as good as any,) and pulled up with as little injury to the plants as may be; the tap-roots cut off about six or eight inches below the crown, and the tops about an inch and a half above it. This done, the plants are then to be plunged in water, and carried to the place intended for them to grow. Rows are now to be ranged in nice order, at the distance of three feet four inches apart, and the plants are to be set with a dibble at the distance of one foot from each other in the rows. The rows after this operation should be well watered; and when the weeds begin to appear, horse-hoed; the plants are at the same time to be hand-hoed. These operations must be performed as often as necessary, till the spring following, when the plants will have acquired surprizing vigour, and will be early ready to cut.

A plantation thus managed, was five times cut in one summer.

After every cutting, fresh hoeing is repeated, and the writer advises once or twice a year a dressing of foot,

foot, peat-ashes, soap-ashes, malt-dust, or any other light manure which will preserve the plants in full vigour for many years.

An acre of lucern thus managed will produce green food sufficient for two horses, and one cutting set apart for hay besides. This, however, the author is cautious of recommending, as lucern is a slow drier, and a quick grower; so that the plants underneath the cut lucern are often blanched and even rotted before the hay is sufficiently made; unless removed to an adjoining field, which is sometimes impracticable, often inconvenient, and at best very troublesome; it is therefore more advisable to proportion your quantity of lucern, to the number of cattle you have to feed.

A remedy, however, is proposed for this inconvenience, and that is, between every other row of transplanted lucern, to leave an interval of six feet, instead of an interval of three feet four inches, which will give sufficient room to turn and make the hay, without annoyance to the growing plants; but still, says the author, two difficulties remain to be struggled with; first, to make it properly; and next, to preserve it when it is made.

As lucern is not only extremely juicy, but that juice is of a viscid nature, it is very difficult in England to make it into hay. If heavy rains of long continuance set in immediately after the lucern is cut, in a few days the leaves will turn white, and the hay will be of no value. If gleamy sun-shine succeed after cutting, the swart must be turned gently, or the leaves will fall from the stalks. Something like this will alarm the husbandman in the most favourable seasons; for which reason lucern must not be turned in the hasty manner of other grass, but cautiously; and when it is removed into wind cocks, it should be done on hand barrows and not with forks or rakes; and it would be very proper to place by way of ventilator,

tilator, an empty osier hamper in the middle of each cock, to preserve the delicious flavour that remains for cattle after the herbage is dried. This being effected, it is next to be carried to a hay barn of an easy construction, (of which the author has given cuts) and there deposited, a layer of clean dry sweet wheat-
en straw, and a layer of lucern alternately till the whole is stowed, which will not only prevent the lucern from firing, but augment the quantity of fodder; for the straw by this means will imbibe a fragrance and moisture from the lucern, and cattle will eat both with greediness when thus mixt together. In case of sickness the fine lucern may be picked out and given to the distempered beast, and will prove an excellent remedy for many disorders. It should by no means be stowed in common barns, where damp floors, or earthen walls may taint it, or dust, cobwebs, or filth from the thatch affect its purity. It should touch nothing but clean boards, and receive the influences of the air with as little rain as possible.

From what is here said, it should seem, that lucern, which the author has taken so much pains to improve, is not yet arrived at sufficient facility for common husbandmen to attempt, and if so much care and circumspection were absolutely necessary, what this gentleman has said of corn might even be extended to lucern. "Out of justice to my own intentions, says he, I take the liberty of observing that I no wise recommend the *New Husbandry* to farmers for raising corn, as such culture will require more industry and attention than men of their occupation or cast of thinking either will have inclination, or will have leisure to bestow, nor am I quite clear that the profit will greatly counterbalance the expence and labour, but still I exhort them to copy the *New Husbandry* in neatness, cleanliness, and extirpation of weeds; and recommend it strongly for the culture of horse beans,
field

upon an acre ; it will bear pasturing with sheep ; it makes good butter ; it never blows nor hoves cattle like clover ; it will flourish upon poor, light, sandy, shaltery, or stoney land ; its cultivation is neither hazardous nor expensive ; if the land be prepared as is generally done for a crop of turneps, there is no danger of any miscarriage ; it may be sown late in the spring with oats or barley ; a pea-field drilled in rows and kept clear by hoeing makes an excellent preparation for burnet, as the pea crop is ripe soon enough to admit of two plowings to prepare it for the reception of seeds by the middle of August, the proper season for sowing of burnet ; it is an excellent succedaneum to the ruined crops of turneps, and if sown when the turneps are destroyed by the fly, affords excellent pasture for ewes and lambs in the spring. See Gent Mag. Vol. xxxvi. p. 178.

Mr. Baldwin, the other gentleman whom I have before mentioned, made several experiments upon Burnet by sowing it at different times ; he first sowed the seeds of it the beginning of July, and the plants came up vigorous and strong, which encouraged him to prepare about an acre of land, to which on the fourth of October, he removed the plants, and set them in rows, twenty inches from row to row, and fifteen inches apart in the rows. The plants succeeded well, and through the ensuing winter they vegetated vigorously, and their verdure appeared very beautiful. No watering was used to this plantation. The plants were once hoed, and stood over for seed ; the crop of which, however, yielded much less seed than was expected, owing to the dryness of the season ; 160 lb. was the whole amount. Mr. Baldwin was now impatient to see how his cattle would eat it, as some of his acquaintance had asserted that no cattle would touch it. When it had recovered from the scythe, and was sprung up afresh, he ordered four cows and two horses to be turned into it ; the cows fed freely

C H A P. XVII.

Of Burnet.

SOME ascribe the introduction of this plant as a winter's food for cattle, to Wynne Baker, Esq; others to Mr. Roque of Walham-Green. To the latter the public are most certainly indebted for the supply of seeds that first enabled the competitors to make good their claims to the premiums offered by the society of arts for the sowing or planting the greatest quantity of it. Writers however are greatly divided in opinion, concerning the merits of it. Had it, upon repeated trials, been found to answer the great things said of it, too much praise could not have been bestowed on those who had been the means of selecting it; but as the properties of it are disputed, and it has almost fallen into disuse as soon as discovered, it matters but little who was the first promoter of it.

That it has had its advocates, appears from the testimonials of gentlemen of undoubted veracity, among whom are two gentlemen who appeared early in its favour, the Rev. Mr. Lambe of Ridley in Kent, and Christopher Baldwin, Esq; of Clapham, in Surrey.

Burnet, says the first gentleman, I am fully persuaded will prove a very great acquisition to husbandry on many accounts, but more particularly for the following reasons; burnet is a good winter pasture, consequently it will be of great service to the farmer as a constant crop that he may depend upon, and that without any expence for seed or tillage after the first sowing; it affords both corn and hay too; burnet seed is said to be as good as oats for horses: they will eat it well: yields at two mowings in the same summer ten quarters of corn and three loads of hay upon

was proved by equal evidence, that some cattle obstinately refused it, and that others could with difficulty be brought to touch it. In this extraordinary variation add they, Burnet differs from any kind of plant cultivated for the purpose of grass.

Mr. Miller has therefore exploded it, and I believe with very good reason, as a project of *Rogue's* to amuse the credulous and make money of the seed. His words are remarkable. "This plant, says he, has been of late recommended by persons of little skill to be sown as a winter pabulum for cattle; but whoever will give themselves the trouble to examine the grounds where it naturally grows, will find the plants left uneaten by the cattle, when the grass about them has been cropped to the root; besides, in wet winters, and on strong land the plants are of short duration, therefore very unfit for the purpose, nor is the produce sufficient to tempt any persons of skill to engage in its culture." He concludes with cautioning gentlemen inclined to make trials to begin with small quantities, in which I most heartily join him.

It may be necessary, however, to point out the particular kind of seed, which has been tried with the greatest appearance of answering the intended purpose, as it is thus described by an intelligent cultivator; these seeds are contained in a rough oval capsule, having four prominent ridges frequently dented, yet more often with smooth edges. These ridges divide the outward surface of the capsule, longitudinally into four nearly equal parts, the spaces between the ridges being rough or cellulated like a peach-stone. On removing this rough capsule; there appear two little seeds somewhat resembling the kernels of an apple, but much smaller, each separately inclosed in a thin tegument, in contact with, but not attached to the outward husk or capsule, which being of an oval form as already mentioned, the small contained seeds must necessarily have one side flat, and

and the other convex. The situation of the seeds within their teguments or coverings may be best seen by cutting one of the capsules with a pen-knife. The size of the capsules varies according to the vigour of the plant from whence they are taken; some are no bigger than a mustard seed, while others arrive at the size of a small pea.

The proper time for sowing these seeds seems to be in July, as Mr. Baldwin's seeds grew well when sown at that season, and the same year's shoots were fit to transplant in August; whereas the seeds that were afterwards sown, on the twenty-sixth of August, did not appear above ground till the twenty-eighth of the following month. Mr. Baldwin sowed after the rate of thirteen lbs. upon an acre.

C H A P. XVIII.

Of Grasses properly so called, and particularly Darnel or Ray-grass.

WRITERS in general complain that no part of husbandry has been so much neglected as the cultivation of grasses. If the complaint were confined to what is generally comprehended by botanists under the name of grasses, and to those plants only, which according to Ray have a round, jointed, and hollow stem, surrounded at each joint with a single leaf, long, narrow and pointed, and whose seeds are contained in chaffy husks, it would be partly just, and partly without foundation; for within this description wheat, rye, oats, and barley are included; and it cannot with justice be said, that either care or skill has been wanting to bring the culture of these to the greatest perfection; though, at the same time, it must be acknowledged that many of the tribes of grasses that grow naturally in our meadows and pastures, under this definition, have been

been suffered to occupy their native spots without either care or culture.

Of the tribes of grasses here particularised, I know of but one species, whose seeds have been selected, and for the propagation of which in its purity any kind of pains have been taken by ordinary husbandmen. Other species have indeed of late attracted the notice of gentlemen engaged in general improvements, but none except the Darnel or Rey-grass have taken place in the general system of husbandry as practised in this country. The reason is obvious, the artificial grasses, or that species of food for cattle that have been introduced under that general name, have been found upon repeated trials to be so much superior to those we call natural Grasses, that the farmer's attention has been diverted from the latter, and wholly directed to the cultivation of the former, except when his lands were intended to be converted from arable to pasture, and then some natural perennial grass was found necessary to mix with the artificial grasses, in order to secure a succession of crops.

It may indeed be more owing to accident than design that the Rey-grass has been selected in preference to the numerous tribes of other grasses for the purpose here spoken of. But it must at the same time be said in favour of Rey-grass, that all the grazing animals eat it while young, and that when made into hay none of them refuse it. Mr. Stillingfleet, who was no friend to Rey-grass, says, that in rich land it makes a most excellent turf; but does not recommend it for parks, because the venison he eat out of a paddock abounding with it, did not please his palate.

The greatest objection that I have heard urged against Rey-grass is, that when it is cut early and afterwards pastured, the cattle are less fond of it than
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when it first rises in the spring; and that in lawns or other open pastures in the view of pleasurable villages, the Benits disfigure the prospect by their disagreeable brownness.

Certainly it is, that neither cows, horses, or sheep will eat the flower stems of the Rey-grass, nor indeed any of the other benity grasses after they have arrived at a certain height. In downs, commons, parks, and open pastures, the grass is seldom suffered to rise to any considerable height, the young shoots being pastured off as fast as they spring from the roots; so that plants of any kind seldom shed their seeds in plains where cattle of every kind are suffered to graze at large. I therefore can see no great force in this objection against Rey-grass, nor do I think that the farmer would be much a gainer by substituting any of the other tribes in its stead. The culture of this grass is now well known, its produce has been ascertained by general experience throughout the kingdom; it is not nice as to soil, and it rises early in the spring; these are advantages that cannot be so certainly rely'd upon by a change; but were experiments to be made of other grasses, and were the result of those experiments to be made public in all the news-papers, there is no doubt but proper attention would be paid to those that proved successful even by common farmers.

The people of this country from the peasant to the peer are fond of novelties; and there wants only a new object to be pointed out to their choice, and they are ready enough to pursue it even to their loss.

I have myself read with very great attention the observations which Mr. Stillingfleet has made on this subject. I have considered the specimens he has exhibited, and though it were to be wished for the honour of English husbandry, that our lands were purged from many of those noxious weeds and plants

that disfigure our pastures, and at certain seasons are hurtful to cattle, yet I do not know of one specimen, which that gentleman has selected, that has more good qualities to recommend it to the husbandman's cultivation than the Rey-grass of which he is already in possession, unless the annual meadow-grass be urged as an exception.

This grass, Mr. Stillingfleet says, makes the finest of turfs. It grows every where by way sides, and on rich sound commons. It is called in some parts the Suffolk Grass, and he adds, that he had seen whole fields of it in High Suffolk without any mixture of other grasses. On the Malvern-hills too he had seen it on a walk that was made there for the convenience of the water-drinkers, though none of it was to be found on any other part of the hills; from whence he concludes that it would flourish by rolling, as indeed every other kind of grass will do at first coming up.

If those writers who so strongly recommend the selecting of grasses were farmers, they would know, that one good sound and wholesome species of perennial grass that will flourish in almost every arable soil, and by the culture of which their lands are easily converted from corn to pasture, and from pasture to corn again, is to them of more value than all the tribes of annuals and other grasses added together. It is not for farmers to break up commons, heaths, marshes, downs, and extensive wolds, to change their natures, and to fill them with seeds they are not accustomed to bear. Gentlemen, indeed, may be induced by plausible reasoning to endeavour to alter the nature of things, but farmers who know by experience how hard it is to force land naturally inclined to the production of one kind of vegetable to forego its propensity, and to take kindly to the propagation of any other, despise the suggestions

tions of speculative reasoners, and when they find themselves possess of one manageable plant, do not readily care to part with it for the hazardous admission of any other. The grasses, for the seeds of which the Society of Arts have offered premiums, are chiefly those enumerated by Mr. Stillingfleet. For my own part, I declare frankly, I cannot see the use of transferring any of them into our arable fields in preference to Rey-grass. However, I would by no means discourage any laudable attempt to promote discoveries. If any one tribe of grasses, either natural or artificial, is observed to vegetate more vigorously in the winter than any other, the discovery of it would be of infinite use, and it were next to infatuation not to encourage the propagation of it. But while we are in possession of Rey-grass, the red and white clover, trefoil and St. Foin, lucern and vetches, we need not lament the want of fescues, fox-trails or dogs-tails, poes, or yellow oats, nor indeed of the so much boasted vernal grass. The grass, indeed, of which Mr. Stillingfleet received an account from Mr. Dean of Ruscombe, which grew in a field of four acres always under water, and maintained five horses from April to the end of harvest, deserves to be regarded, though very few situations of this kind are to be found, I believe, in England to try experiments upon; but the grand object that should principally excite the curiosity of the Society of Arts to discover, is, the grass growing in the watery meadows in Wiltshire, mentioned by Mr. Stillingfleet, one acre of which is let for 10 or 12 l. a-year, and of which, if there is such a grass, it would be no difficult matter, I should think, among the members of so great a body to find out.

What is here said may perhaps want an apology; but as I myself write from conviction, and with no view either to decry the labours of others, to flatter

their foibles, or to suppress their excellencies, I shall not be afraid to speak my sentiments, though they may not always coincide with those of greater names than my own. I am persuaded that Mr. Stillingfleet was in earnest to promote the interests of agriculture, and to that gentleman no part of agriculture seemed to want greater improvement than the cultivation of grasses. He took much pains to select the seeds of those which he thought best deserved the husbandman's attention; yet it is observable, that among all his numerous friends, for no gentleman had more, nor deserved them better, (I speak from knowledge) he mentions but one, the ingenious Mr. Aldworth of Stanlake, who endeavoured to assist him in his favourite undertaking; that gentleman, he says, saved at his desire a small part of a rich meadow, and gathered from it near a bushel of seeds of crested dog-tail. He does not add, that these were again sowed, or that it was ever thought an object of public attention to propagate them.

The Rev-grass, which is chiefly the subject of this chapter, must not be thought to flourish in soils not natural to it without proper care and good dressing. I may venture to lay it down as a maxim, that no plant transferred from its natural soil to soils that are not natural to it, will long continue to flourish without some additional assistance. Why then should this be expected of Rev-grass?

When lands are to be laid down with this grass, they should be made fine with the plough, and fertile by dressing. The fold affords, undoubtedly, the richest and best; next to that peat-ashes, soap-ashes, coal-ashes, foot, or any of those light manures abounding with salts, and free from the seeds of any sort of weeds.

There can be no better preparation for laying down lands with grass than turneps after a summer's fallow,
well

in a field of cultivated grafs; nay, even in meadows of natural grafs. The best way of destroying them is by steeping tobacco leaves in urine, opening their hills before they become formidable, and pouring the quantity of a quart or three pints into each. If they are haraffed for a few days in this manner, when they are beginning to get together, they will take their leave of the place, and be no more troublesome during the remaining part of the season.

I have now enumerated all the grasses natural and artificial, that I think most likely to answer the husbandman's purpose in the cultivation, and I have cursorily recommended all the methods that have come to my knowledge of draining, improving, and dressing grafs lands. Other methods there may be, and no doubt many, that I am not acquainted with; but if this little book should chance to be approved, something may be added from future experience that may make it more perfect.

I shall now pass in order from what may be properly called the summer feed of cattle, to some attempts that have lately been made to introduce an additional supply of winter feed.

C H A P. XVIII.

Of the Turnep-Cabbage.

THE turnep-cabbage is so called, because the stalk, at some distance from the ground, after rising of the usual thickness, and in manner of those of other cabbages, enlarges suddenly to such a degree, that it forms a knob of the magnitude of a common turnep; of which, likewise, it has sometimes the figure, though generally it is more oblong.

By this peculiar formation of the stalk, or production of the turnep-like knob, together with its being perennial,

nial, this species of cabbage is distinguished from all others. From the top of the turnep rises a number of leaves of a greenish-red, or sometimes of a greenish purple colour; which answer to the radical leaves in other plants. They do not, tho' this plant is truly of the cabbage kind, ever close together, and form a compact globular or oblong mass, as in the common species; but keep their erect growth, or turn outwards.

From among these leaves springs a number of other stalks, of which those that are nearest the extremity branch, and send out flower stalks, spreading horizontally; and those that are more in the center, grow erect, and without branches. On these stalks are leaves, springing out alternately, and of the same colour with the others. The flowers are small and yellow, and succeeded by long pods, full of seed, of the size of that of mustard, and a light-brown colour. It may be justly doubted, whether or no this plant be originally a native of our country; though it is at present found growing wild in some places near Dover.

This plant affords sprouts, which, after they have undergone the action of a strong frost, are exceeding good; and may consequently be had at the time when most others fail.

It appears from Gerard, that there were, in his time, two kinds of this plant; one of which he calls *Caulorapum rotundum*, or round rape-cole; and the other, *Caulorapum longum*, or long rape-cole. The difference of these two kinds consisted only in the form of the knob or turnep, as is expressed by the names themselves; and in the long kind's shooting forth smooth indented leaves from the turnep part, which leaves the round kind wanted.

This plant was rare in Gerard's time in our country; as he mentions his having the seed from Spain; and indeed it was so little known, that he says it is to
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be sown and set as cucumbers and melons ; and that it was then accounted a dainty meat.

Tournefort, and most of the later writers, mention this plant under the various names of *Brassica conglodes*, *Brassica caule rapum gerens*, *Brassica caulescente orbiculari carnosæ foliis sessilibus*, *Brassica radici napiformi*. But they do little more with regard to it, than give the name and description.

Mr. Baker, must have the honour of being the first who really introduced this plant into use, as an article of husbandry. For it was on the authority of his judicious experiments, that the London Society offered a premium for its culture : and there is no one object of a similar nature, hitherto taken into consideration, either by this Society, or that of Dublin, which bids fairer for being of great public utility.

The turnep-cabbage may be cultivated in the manner of other cabbages, either by sowing the seeds in the autumn, and transplanting them in spring ; or by referring the sowing till the spring, and transplanting in June. Where the plants are raised in the spring, the seed should be sown in the very beginning of March ; the plantlings pricked out on a proper bed, as soon as they are sufficiently strong to bear it, and the final transplantation of them out into the field at the distances which they are to grow, should not be deferred later than the beginning of June. This would both give more time for the plants to become large before winter, and a better chance to avoid a total want of rain, after transplanting, the only accident, except the destruction by caterpillars, or other insects, to which this kind of crop is subject ; as the plants bid defiance, after they have firmly taken root, to all inclemencies of weather, either with respect to cold, wet, or drought.

It may be inferred from the above particulars, which, as we see, stand on unquestionable authority, that,

that, considered as an article of husbandry, this plant must be a very valuable acquisition ; as it is of easy culture, and as little subject to fail by accident, as any crop whatever : as the produce, with respect to quantity, is likely to prove, under favourable circumstances, thirty-five or thirty-six tons per acre ; as its produce is greatly preferable either to turneps or other cabbages, being much more nutritious, and less watery and cold, a fault in the common turneps ; as it may be depended on in the most rigorous and severe seasons when every thing else but dry fodder fails, and may be taken from the place of growth, in case of exigence, whenever the ground is not covered with a very deep snow ; and as it is much liked by neat cattle, sheep, deer, and hogs ; agrees perfectly well with all of them ; and fattens them in the most profitable manner. This is certainly very sufficient ground of recommendation, as an object for a premium to the London Society ; and it is hoped, will be so, as a subject of experiment and trial to those gentlemen, or more liberal kind of farmers who attempt improvements in husbandry. This high recommendation of the turnep-cabbage is extracted from a paper in the *Museum Rusticum* signed *Agricola*, and I have only to add to his account, that I have tried a few plants in my garden, and found them answer all that is here said, and do believe this turnep-cabbage to be very well worth the farmer's attention where either sheep or neat cattle are kept in any considerable number ; yet at the same time I cannot help giving credit to what Mr. Reynolds has said of the turnep-rooted cabbage, as being preferable.

C H A P. XIX.

Turnep-rooted Cabbage.

THIS plant about three or four years ago was accidentally introduced into England, by Mr. Reynolds, of Adisham, in Kent, in pursuance of the premium offered by the Society, for the cultivation of the turnep-cabbage above described. This new comer, as I am utterly unacquainted with the culture of it, I cannot recommend better than by copying the letter of the gentleman by whom it was first planted to the Society of Arts, in which an account is given of the discovery and management.

May 3, 1760.

My Lords and Gentlemen,

“ Pursuant to your intimation, I transmit to you an account of all my proceedings relating to the plant called *turnep-rooted cabbage*.

“ When I found there was a premium offered by your most laudable society for cultivating the turnep-cabbage, I began to think there must be some more than ordinary quality in it, which you were desirous of introducing to public use. This put me upon the trial. But my first endeavours were frustrated by an unsurmountable difficulty for want of seed, none being to be got, at least by me in England. Recourse was then had to a noted seedsman in Holland, who returned a pound of seed, which was all, he said, he could procure, and was of the growth of Russia; with this assurance moreover, that the plants would stand the severest winter. This gave me encouragement to proceed. A piece of ground, consisting of sixteen perches of a hazle mould had long before been made ready, by three good plowings. This piece was stir-
ed

ed again on receiving the seed, which made a fourth plowing. The seeds were sown on the 15th of April, 1767, and about the latter end of June were ready for transplantation.

“ The field allotted for this purpose consisted of five acres, two acres of which had been fallowed the year before, two acres had produced oats, and one had borne rye. In order to see what effect dung would have upon it, a certain part of it was thick folded with sheep-dung, the fold passing quite thro’ the whole field lengthwise, while the remainder on both sides was left unfolded. As this field had in it different soils intermixed, namely, clay or brick earth, strong cledge, flint gravel or stoney-ground, gartle loam, hazle mould, and a small patch of crumbly chalk; my design was by passing the fold thro’ the whole, to mark the different effects the dung might have upon every different kind of soil; and knowing that all the cabbage tribe required deep earth to root in, I caused three acres to be plowed in different depths, namely ten, twelve, and thirteen inches. This was done quite thro’ the field lengthwise; the plough passing thro’ all the different soils at an equal depth in one furrow. The other two acres had only common plowings. This was performed about the middle of December, 1766. The second plowing was crosswise, which we call balking, a term used for striking furrows of a good depth, ten rows to the rod. This was done in January, 1767. The third plowing was done in the same manner, towards the end of March. This we call splitting of balks, and previous thereto, the balks were harrowed down dry. The fourth and last plowing was towards the end of May lengthwise exactly at the same depth with the first plowing. In this manner were the plowings which were performed dry completed; and thus did the land lie till within two or three days of planting. Then it

was

was well drilled, a term used for harrowing and rolling, that the ground might be sufficiently fine to receive the plants. The ground being in this manner prepared, the planting began as has already been noted, about the latter end of June. The rows were formed across the field, some at two feet intervals, some at two feet two inches; and others at two feet four inches. In the first the plants were two feet apart in the rows; in the second they were 22 inches; and in the third they were in general 20 inches; but some few were two feet, and others 18 inches. Four acres were planted in this manner; and by way of trial, we planted also several rows of common cabbage, two sorts of brocoli, favoys, and Siberian borecole, commonly called Scotch-kale. These with some coleworts sown in the broadcast way completed the field. The plantings were performed as fast as the plants advanced in bigness, and the whole was completed before the end of July. Frequent showers often intervened, and all grew to admiration; but a little time discovered that we had only a small sprinkling of the common turnep-cabbage, and that all the rest was a new species which neither myself nor any one else in my neighbourhood knew any thing of, yet liking their countenance I treated them in the best manner I could.

“ The common cabbage, the two brocoli's, the favoys and Siberian borecole, together with the sprinkling of common turnep-cabbage, were all treated alike with these new guests, save only that the former were planted farther apart, but none but the borecole and the new comers survived the frost; an instance this of the superiority of the new species over the other sorts, particularly in its being impenetrable by frost.

“ In transplanting these several kinds, we made use of a kind of trowel instead of a dibble, which
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more easily penetrated the ground to the depth required, and the planter more readily placed the plants behind the trowel by moving it forwards before he pulled it out. This done, the planter trod the earth close with his feet, which formed a little dent to receive the rain, and to hold it about the roots. Two men worked at one line, which was marked at the distance intended for the arrangement of the plants. A number of plants sufficient for one were laid at each end by the drawers of them. The planters dropped the plants at the marks till they met at the middle of the line ; then returned back, planting as they went, and each man getting at the end of the line at the same instant, they removed it to the required distance, and so proceeded. The stones, clods, or bits of chalk, they brushed away with the trowel at the mark, so that none of them, nor any dry earth entered with the plant.

This is a most excellent method of planting.

“ Soon after the planting, the hand-hoe was applied to the plants, in the rows, which nourished them greatly. The horse-hoe was made use of for the intervals three several times according as the weeds advanced. The earthing them up gradually by horse-hoeing, proved very useful as a defence against the frost, the crows and the rooks ; these last are great enemies by pecking holes in the bulbs, and thereby occasioning decay and rottenness. One horse and man hoed four acres in a day ; the rows were cleaned occasionally with the hand hoe.

“ The effects were, that these plants which were in the clay or brick-earth soil did not turn out to be so good by one half as some of the others ; nay they were the worst in all the field. Those on the stiff cledgely land were but little better ; the stoney, flint gravel, gartle, loam, and hazle mould were but little different from each other, if any thing, the last was the best.

“ The

“ The plants on one perch, indifferently chosen, where the deep plowing was performed being taken up the 15th of February weighed 254 lb. another perch taken in the same manner on the 26th of March, weighed 393 lb. a third from the same ground taken April 27, weighed 476 lb. the number of plants producing these, being 68 each time, and no more. Those on the crumbly-soil exceeded these by 4 lb. The only error in the economy of these plants was consuming them too soon ; for what were taken up in February, had they stood till April, would have maintained near twice the stock ; whereas turneps grow sticky when going to feed.

“ Mr. Reynolds made another trial of this plant by preparing an acre of poor ground, on a small part of which were laid two cart-loads of dung mixed with mould as is usual before plowing ; on another part were laid two cart-loads more after plowing. The plowings were performed, as before, 12 inches deep, and the planting was in rows, as before, two feet apart, and the plants in the rows, being 18 inches from one another. The produce upon this acre proved every where alike, those parts where no dung had been laid were equally good with the dunged ; and the whole acre throughout was not at all inferior to the best acre in the five-acre field ; a proof this, that the turnep-rooted cabbage wants neither dung nor rich ground to make it flourish ; deep plowing being all that it requires.

“ Horned cattle are fond of the herbage of this plant, which may be eaten off more than once without injury to the turnep-root, and, the milk and butter are upon trial very good. If full grown sheep are put to feed, instead of the herbage, they fall upon the roots, which occasions them to rot ; but lambs may be safely trusted, half an acre being eaten off twice by them after weaning at times when the weather was
very

very severe. These feedings were made by way of trial, both of the lambs and plants; the lambs thrived well, and the plants after being fed off the first time, renewed their herbage for a second feeding.

“When they were to be wholly consumed, root and branch, Mr. Reynolds caused his shepherd to dig them up occasionally, and he would fork up as many in three or four hours as would serve 250 sheep a whole day.”

Mr. Reynolds, who appears to be a most intelligent and useful member of society, has taken more than ordinary pains to recommend this plant, and has made such pertinent remarks upon its culture as deserve the utmost attention. It is not necessary, he says, to be very nice about the soil for this plant, as it will grow as well if not better upon poor dry land, than upon that which is wet, strong or stiff; neither dung nor other manure is required, only deep plowing. Where the ordinary plowings only were performed, the produce was less by one third than where the deeper plowings, of ten, twelve, and thirteen inches had increased the tilth. The foldings seemed perfectly useless, no marks of superiority appearing from the dung. The greatest weight of food was upon the two feet intervals with 18 inch distances between the plants. This gives room for the horse-hoe, on which much of the success depends. The seedling plants in their natural state Mr. Reynolds found to be better than the plants that were eaten off by the lambs. He discovered too that the game from the woods hurt the growth of the plants, and that such as were nibbled or pecked by them, never arrived to perfection. Winter-feeding these plants he estimates at 15s. per acre; but adds, that as they continue increasing, not only the winter, but even the whole summer following, the planter must use his own discretion with regard to the consumption.

Having

Having thus minutely acquainted the Society with the manner of discovering and managing this new species of winter food, Mr. Reynolds leaves nothing unnoticed respecting its preservation and extension. As he has already observed that the fly is fond of the seedlings, to prevent their ravages, he advises, at the time of sowing, to mix the seed with a large proportion of the long-topt raddish seed; which being a quick grower, he says, will entertain the flies till the plants we are speaking of are out of danger; notwithstanding this precaution, if they should be attacked, an effectual way to preserve them, is, to run a light roller over them night and morning while the dew is yet fresh upon their leaves. This will lick most of the insects up if it be duly performed. He says, he has had three such rollers going a whole night, by which contrivance he preserved his turneps in the year 1739, when hardly any besides escaped in Kent; that year was fatal too in France, and he sold great quantities for exportation the winter following.

To this account of the turnep-rooted cabbage, Mr. Döffe, in his *Memoirs of Agriculture*, has added the botanical description, its place of growth, and its peculiar excellencies; and concludes, upon the whole, that it must be a very valuable acquisition to husbandry. The resistance to all frosts, and even such moisture as will destroy the common turnep—its duration throughout the whole year; the advantage of being raised on ground not rich and without manure; and the greatness of the produce, no less according to Mr. Reynolds than 34 ton upon an acre, with its wholesomeness and nutritive quality—all combine to render this plant far superior to any of those raised annually for feeding cattle in the winter and spring; and adequate to the idea of the Society for the encouragement of Arts with respect to a winter pabulum for cattle, which they so assiduously and earnestly sought after.

It were unjust to Mr. Reynolds, to conclude this Chapter without acknowledging my obligations to him for the substance of it, and paying the tribute of praise that is due to a benevolent mind, "I rejoice, says he, at the great good that may arise to the public from the careful cultivation of this plant, and the more so, as being the happy instrument myself of its introduction."

C H A P. XX.

Of Cabbages properly so called.

AFTER all that has been said of the turnep-cabbage, and turnep-rooted cabbage, gentlemen, and even farmers in the northern counties, have introduced the common cabbage into their field culture, in preference to the other two, and have cultivated the Battersea and Great Scotch sorts to considerable advantage. Having read Mr. Young's North Tour, in which he has taken great pains to recommend their culture, I was very soon convinced of their utility, and determined to give them a fair trial as an improvement; for which purpose I caused a spot of ground, which I have set a-part for experiments, to be richly manured, well plowed, and thoroughly cleansed from weeds. I at the same time wrote to the North of Scotland by the master of a ship for a quantity of the true seed of their winter cabbage, and before the return of the vessel I caused a small plat, not more than ten yards square, to be prepared for the sowing of it.

It was March before the seed arrived, and in the same month it was sown. The plants came up strong and in great plenty, and finding that their number would greatly exceed the ground I had allotted for them, I caused about an acre and a half of an adjoining

joining field to be plowed and summer-fallowed in order to try the success of the supernumerary plants when the spot was supplied which I at first intended. This spot was little more than half an acre.

The acre and half piece was thrice plowed, but some part of it was of a harsh nature, some part gravelly, and the rest a tolerable good soil, of a brown colour a-top, and inclining to a sandy loam at the depth of about eight inches. On part of this field, oats had grown the preceding year, and on the rest turneps.

The experimental spot was first planted, and rain succeeding soon after, very few of the plants miscarried; by far the greatest part of them began to stand erect in a few days; and I was much pleased with their promising appearance. This planting was performed about the middle of June, and about the beginning of July the plants that had failed were supplied.

Encouraged by this favourable beginning, I caused the acre and half to be planted as soon after as the soaking rains, that had followed the first planting, were a little dried up; and as I employed my gardener to assist in the operation, the whole plantation was very soon completed. I observed that my gardener who had been accustomed to transplanting, did just as much as two labourers to whom that kind of employment was new. This plantation was not completed till after the first week in July.

During the last summer the intervals of dry weather were but short, and consequently it was not long before rain raised almost all the new set plants in this latter plantation upon their roots, and they soon began to thrive and promise a plentiful crop. I had ordered them to be at four feet distance every way for the convenience of horse-hoeing cross-wise, but as the rains fell frequently, and I found few opportunities to introduce the hoe-plough to advantage, the

weeds and the plants seemed to vie with each other for the mastery ; inasmuch that when some successive days of dry weather made way for the hoe-plough, the cabbages had spread so wide, that the plough could not pass without breaking off the branches.

Hand-hoeing was then the only remedy ; but that was a tedious business, and rain falling while it was performing, the weeds took root almost as fast as the hoe displaced them. In circumstances like these perseverance surmounts many difficulties. The weeds were subdued, and the cabbages in the experimental spot grew rapidly and vigorously ; but the cows that fed in an adjoining orchard broke in upon them in the night, totally eat out the hearts of some, and defaced and disfigured many more.

I was not more fortunate in my acre and half piece, yet many more cabbages remain now untouched than are necessary for the cattle I have to winter-feed ; and there are at the day of writing this (Dec. 13, 1770) some thousands that have escaped all accidents, and are some of them from sixteen to twenty pounds weight, perfectly sound, notwithstanding the sudden transitions from rain to frost and from frost to rain, which of all weathers is the worst for plants so highly putrescent as the ordinary cabbages are known to be.

These cabbages are of a purplish colour variegated with streaks of white, are not disagreeable while growing, but boil of a pale salmony hue, and have a sweetness not natural to those cultivated for the table. They are however very hard and compact ; their hearts are as solid as the red cabbage of our gardens, but they do not eat near so crisp pickled.

Having more than my cattle can expend in several months, and fearing lest the frost should affect them, I made some enquiries to learn if they were saleable in the London markets, but found very little encouragement to attempt to introduce them to
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the tables of the inhabitants. They seem wholly calculated for the winter feed of cattle in this country. Cows are very fond of them, and I do not find they give the least bad taste to their milk. Sheep and hogs are immoderately fond of them, and, perhaps, if they continue sound till the ordinary winter feed is pretty near exhausted, these intruders, as they may be called, may come into demand.

It remains only to note, that where the oats grew in the acre and half piece, the cabbages arrived to no extraordinary size; where the earth was rich and had been folded, abating for the later planting, the cabbages in some places equalled the general run of the cabbages on the experimental spot; but where the land was hard and sour they did not thrive at all; from whence I conclude that rich land well manured and thoroughly plowed is the only ground to plant cabbages upon, and by this first experiment that I have made, I am inclined to think that three feet from plant to plant is the proper distance for what is called the Scotch Cabbage, as on the richest spot where they grew the largest, they never thickened so much, but that one could walk between the rows without breaking any of the leaves.

From the number of plants which remained after my two acres were supplied, I am persuaded that upon a spot of ten yards square, as many plants may be raised as will plant ten acres at three feet distance from plant to plant every way; and that three quarters of a pound of good seed is fully sufficient for sowing such a spot. Indeed I have taken the pains to count the grains in an ounce of seed of the great Scotch, and find them to be 6000 nearly, so that allowing 4800 plants to an acre, an ounce of seed, allowing for casualties, will plant an acre.

I observe by Mr. Young's account, that several gentlemen sowed the seed in August, pricked out the

plants about Michaelmas, and finally transplanted them about the latter end of May or the beginning of June, but I am persuaded, from the trial that I have made, that the pricking out the plants is a needless expence in the southern part of this kingdom, and that tho' it is the common practice in Scotland to sow the seed in August, in order that the plants may be in readiness to plant early in the spring, yet even that practice may be dispensed with here, and if sown early in the spring will produce plants vigorous enough to plant out about the latter end of May or the beginning of June, which are certainly the best times for that purpose; for I am inclined to believe, that had the summer proved dry, the earliest of my plantings would have been too late to have brought the cabbages to their full growth before the approach of winter.

I observe too, that in dry seasons, some of the northern cultivators watered their cabbages; but as that must be attended with a great expence in most situations, and would be impracticable in some, the choice of soil should be made to preclude that necessity. Rich clayey or loamy soils are undoubtedly those upon which cabbages should be transplanted in the common field; these contain moisture sufficient to supply the wants of the cabbages in the driest years, and for the winter feed of sheep, swine, and neat cattle, I really think, that no land can be more advantageously employed than by growing of cabbages.

Should the culture of cabbages take place generally, it would no doubt be adviseable for every farmer to intermix his plants, and have part Turnep Cabbage, part Turnep-rooted Cabbage, and part the great Scotch, that if one sort should fail, another may be in readiness to supply his wants. There can be no impropriety in intermixing the plants, as each plant has its portion of earth allotted to it cultivated separately,

separately, and when the seed is to be raised, each species may be planted in a compartment distinct from every other. By this means the provident farmer, who observes this rule, and who takes care to have a supply of turneps besides, need never be at a loss for winter feed for his horned cattle.

C H A P. XXI.

Of Cole-feed.

Cole-feed is another addition to the winter feed of cattle, that in several parts of the kingdom is much cultivated. I cannot help remarking, upon this occasion, how very difficult it is, when any plant has obtained the preference in any particular place, to persuade men to change it for another that is manifestly more profitable. I do not, however, mean by this observation to decry the culture of Cole-feed, or to persuade the farmer who is possess of it, to give preference to any of the former kinds of winter feed in exclusion to cole-feed; I only mean to persuade him to give some of them a fair trial, and not to be so much wedded to that particular kind which it has been the custom of his father to raise, as to disregard every other kind, and to treat them as unworthy of his notice.

Cole-feed, I am told, is a most excellent plant to sow upon strong rich land, where weeds are apt to get the better of other crops. The time of sowing is generally in August, and some think a crop of early pease are excellent preparation.

Upon very rich land eight crops have been obtained in little more than five years by this management; namely, a crop of pease with Cole-feed the first year; the second year, the Cole-feed fed off early in the spring, turneps sown immediately after, fed

fed off, and planted with wheat the same year; the third year, the Cole-seed again in course after the wheat; the fourth year, the Cole-seed fed off and barley with clover the succeeding crop: the fifth year two crops of clover, which concludes the course.

Though this course is not improbable with proper dressings, yet it must have been practised rather by way of experiment, than as an example for farmers in general to follow; for, I believe, the sowing of turneps to be fed off in the summer is a new practice, at least it is new to me.

The culture of Cole-seed is very different in different situations; those who sow it for winter-feed only, frequently sow it in autumn after wheat, barley, oats, beans, or pease, plowing in the stubble, and sowing the Cole-seed at the same time, six quarts to the acre; if it comes up thick it chokes the weeds, meliorates the ground, and if fed off with sheep, prepares it for barley and clover. Cows are very fond of the young plants, and if not carefully watched, will *bore* and kill themselves as with young clover.

In other places where they pay a due regard to the raising of the seed, they sow in small plats in the spring as for cabbages, and plant out in rows in July at two feet distance, hoe carefully in the autumn, feed off in the following spring, and then suffer the stalks to perfect their seed in the succeeding autumn.

They have still another method of preparing their lands in the Fens, where they cultivate this plant in greater quantities than in other parts of England. As Fen-lands are very apt to be flooded in the winter, what follows must be understood of those parts of them that lie the highest and can be kept dry, for it would be labour lost to sow Cole-seed in lands that lie long under water.

About the middle of May, if the season is dry, the lands designed for Cole-seed are plowed up, not
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in the ordinary manner of plowing, but with what is usually called a wing-plough, the share of which is exceedingly sharp both at the point and the edge of the fin. This plough pares off the swart about an inch and a half deep, turns it, and exposes it to the action of the sun for drying. This, in the western counties, is called Denshiring.

When the field is thus stript of its swart, men, women, and children, are employed to gather the turfs into heaps in order to prepare them for burning. These heaps are disposed in regular order for the more equal distribution of their ashes after they are burnt. All this is performed as soon after plowing as the weather will permit; but as it sometimes happens that the rains retard the burning several weeks, in which time the earth shoots forth a new verdure almost as rank as that which was pared off, in this case, the next plowing turns up the land in ribbands that fold over one another in plaits, so that very few seeds take root except in the folds.

It must not be forgotten, that if the first plowing is performed from east to west, the second plowing is always at right angles with the first, and is performed from north to south. This they do, that the plants which generally come up in rows may have all the benefit of the air and sun. The hoe has not yet found its way to the Fens, so that when the ground is pared, burnt, plowed, sowed, and harrowed, nothing more is done to it till the plants begin to be eaten off, except when attacked by the black fly; when that happens, the only remedy is to sow the land again; or reserve it for a future crop of oats; for these destructive insects are of the same kind with those that attack the turneps, they spare none that they once attack.

Another enemy to the growth of Cole-seed in the Fens, is the black canker; this is of the worm kind,
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and is no less fatal to the plants when they are arrived to their middle-state, than the black fly is while in their infancy; for these, however, the planters have discovered a partial remedy, and that is, by passing a cord two or three times across the plants, many of the vermin are shaken off, and when once they fall to the ground they never rise.

To a third attack this plant is likewise exposed about the latter end of autumn, when it is almost arrived at its greatest height, and that is from the green caterpillar. This is an enemy equally formidable with either of the other two; but as he generally comes late in the season, the frosty nights soon put an end to his ravages.

Winter being come, and these dangers all past, the owners begin early to turn in their sheep that are about half or three parts fat, to complete their fattening, and to make them fit for the butcher; for Cole-seed they find to be the most fattening food for sheep of any which that country produces. They contrive to have the first crop eaten off by old Candlemas-day, because then they can either determine to plow for spring corn, or, if the land be stout as their term is, to let the Cole-seed stand for a crop.

When it is determined the Cole-seed shall stand, some planters mow off the stalks about four or five inches above the ground with a sharp scythe, by which all the ragged parts that had been lacerated in feeding, are cut off, and the young sprouts that shoot from the sides spring forth more freely, and head more kindly than when those lacerated parts are suffered to remain.

This operation performed, nothing more is done till the plants begin to flower, and then they are still liable to a miscarriage by being sometimes infested with myriads of small green flies that eat up the blossoms,

blooms, and almost totally disappoint the planter of his crop.

To dislodge or destroy these ravenous vermin, some methods have been ineffectually tried; the most provident planters feed off the herbage, and renounce all thoughts of farther profit. This misfortune, however, does not often happen, and healthy crops frequently reward the planter's labour. When these happen, great alertness is always practised in gathering, threshing, and cleaning the seed.

The precise time of beginning requires particular attention, for as Cole-seed will shed very much if suffered to remain too long; so on the other hand, if cut when the pods on the principal stalks begin to be ripe, those on the collateral branches will be quite green; a medium is therefore to be observed, which must be left to every owner's discretion.

Cole-seed is reaped in the Fens in much the same manner as wheat, with this difference only, that the reapers go generally in pairs, and face one another as they proceed, so that in placing their reaps, the heads of the one face the heads of the other, but care must be taken that they do not touch. It is of the utmost importance to have fine weather during the Cole-seed harvest, which generally begins sometime in July, about which season, according to the common course of things, the weather is apt to be most settled. In dry weather the green seed ripens fast after cutting, and even during rains, if not too long continued, the unripe seed will plump, and afterwards when sun-shine succeeds will arrive at maturity; but the danger is from the pods of the full-ripe seeds opening and shedding, which too frequently is the case.

In drying the seed they never turn the reaps, not even if it rains; but sometimes after heavy rains they find it necessary to raise them gently upon the stubbs;
for

for the least coarse handling shatters an amazing quantity of the ripest seed. The stalks being dry, and the weather settled, they then prepare for threshing, which is always performed upon the same field where the plants grew. For this purpose a canvas cloth about 20 yards long, and 18 yards wide is nicely levelled and gently pinned down upon a bed of straw, and then the *Cole-seed sale* [for that is the term they give it] begins, in which about 20 people are generally employ'd, of whom seven are gatherers; these are women, great boys and girls, whose business it is, to gather up the reaps, and place them in the *bearing-sheet*; this they do by means of hooks which they dexterously slip under the reaps, and carry them to the sheet, placing them head to head in the same order they lay, so that the heads meeting in the middle of the bearing-sheet all that shatters is sure to be saved. The bearing-sheet is about ten feet long, and seven feet wide, with loop holes along the sides, through which two slender poles are slipt, by which, when full, it is carried by two stout men called bearers to the threshing cloth, where it is discharged, and then returned to be filled as before; two of these bearing-sheets belong to a *Cole-seed sale*. As soon as the first *bearing-sheet* is emptied on the cloth, there is a man called a *layer-on*, who ranges the contents in rows for the threshers to begin; and while these are employed in beating out the seed of one row, he is busy in preparing them another, and while they are going once over that, he turns the first, which they again go over, and so return to the second; in the mean time, two men called *strikers-off* follow them and remove the stalks that have been twice threshed, while the *layer-on* is preparing a third row to keep the threshers from standing still. In removing the stalks one man forks them up, while the other man strikes them as they rise to clear them.

them of the seed, and as they in this manner discharge them from the cloth, another man, called the *jack-straw*, conveys them away. After the *strikers-off* come two fresh hands, one of them a woman, whose business it is to rake off the coshes, or pods, and short broken straws with rakes made for that purpose; these are called the *fore* and *bind cavers*, the latter of which is, of all the people employed, the principal, as upon his care and dexterity, the loss or saving of a very considerable quantity of seed depends. It is really entertaining to see a *Cole-seed sale* all actively engaged in the performance of their respective functions. The last cleaning and bagging the seed is generally performed by the threshers with others to their assistance after the day's work is over, or early in the morning before the usual time of beginning, for which all who attend are paid an extra price. If the crop is good, and the weather fine, the whole body will complete 30 combs, or 90 bushels, of seed in a day; if middling about 20, but, if any misfortune has happened to it, not perhaps more than eight or nine. Great care should be taken in the bagging, that the sacks are sound, and the seams are well sowed; for this seed will find its way out through a very little hole. From what has been said, it may clearly be perceived, that hardly any crop is subject to more hazards than a Cole-seed crop, and yet many thousand bushels of that seed are annually raised in this kingdom. The reason of which may be, that the whole culture is carried on in the ordinary way. Very inconsiderable quantities only, comparatively speaking, are even now, in the present improved state of agriculture, raised by sowing, pricking out, and transplanting, though that method has manifestly the advantage of the practice we have just been speaking of; but the simple operations of sowing, seeding, and harvesting, have something in them

them so naturally adapted to the genius and education of the people bred to husbandry, that every deviation from the line of those leading tracks is like losing their way, and how far soever compulsion or encouragement may operate to incline them to pursue any other track, they are seldom or ever perfectly easy till they return again to their accustomed road; from whence it is with difficulty they are ever withheld.

But to return to the last process with the Cole-seed crop; and that is converting it into oil. To do this the seed is first ground by two stones of seven feet diameter, which go round on the edges like the stones for grinding of bark, and bruise them on a bedded one, till a whole grain can hardly be seen; and thus they become a meal or coarse flour, of which half a peck at a time is put into a copper-pan over a slow fire, and when it begins to steam, it is then put into bags two and twenty inches long, and eight wide, two whereof are pressed together at once by mills of another construction. One bushel of this seed will yield twenty pints of oil, in measure about two gallons and a half, that sell in the London shops for about 3s. or 3s. and 6d. a gallon, but being mixed with better scented oil will sometimes sell for more. Thirty and sometimes forty bushels have been produced from an acre; and not the seed only, but even the stalks and cakes have found a value, the first for making pot-ash, the last for feeding cattle; or where not wanted for that purpose, the cakes are ground, measured, and sold by the bushel, for a rich manure.

C H A P. XXII.

Of the Teazle.

BESIDES the plants that are annually raised for the food of men and cattle, of which those that have already been treated of are the chief, others have found a place in the field culture of some farmers for the use of manufacturers, among which the Teazle is one of the most necessary. The Teazle, or Fuller's Thistle, is a plant much in request among the clothiers, and is mostly propagated in the cloathing countries. When the cloathing manufacturies flourished at Reading and Newbery, much of it was cultivated in the neighbourhood of those towns. Since it has been removed farther westward, that plant has followed of course. Perhaps it may, likewise, have found its way to the north, if it has not, it must be there a welcome guest.

For the following account of its cultivation we are indebted to a gentleman who has modestly concealed his name, though the public thanks is nevertheless his due for so candid a communication.

The land most suitable for this plant, he says, is that of a thin sweet surface and marly bottom, tho' a clay or stony-trash bottom will do, and produce large crops; indeed poor land of almost any kind will produce this plant, provided it be dry. It is of the thistle kind, and thrives best in thistly ground. In rich land it grows too luxuriant; the heads grow large, and the stems coarse. The sunny sides of dry hills is of all other situations to be preferred; but rising grounds, of any aspect, provided they be hard and dry, are not to be rejected. The editor of the *Museum Rusticum*, from whence this article is chiefly taken, has observed, that the heads should
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arise at a certain size in order to be useful ; but if they greatly exceed that size, the hooks or pines become coarse, and they injure the manufacture. This certain size, however, he has wholly failed to describe.

The ground being chosen, it is next to be prepared ; and it should seem from what the before-mentioned writer has directed, that less preparation for this plant is necessary, than almost for any other. He prefers an old lay, and directs it to be ploughed in February in ridges of three bouts each, at a depth as for a crop of beans, taking care that the furrows be laid strait, and as even as may be, the middle of the ridge highest, with a flesh furrow or henten between the ridges. The land thus plowed may lie till April, when the seed is to be sown.

About the beginning of April, if the weather be showery and the ground moist, the ridges are to be harrowed smooth, and the seed sown broad-cast in the proportion of two bushels to an acre ; after which the management is nearly the same with that for turneps, save only that the plants are to be set out at the second hoeing at a greater distance from each other, eighteen inches being the medium prescribed.

The plants thus set out may remain till the latter end of August, when they must be dressed in a new manner, not with an ordinary hoe, but with a spade of a particular make, four inches broad, eighteen inches deep in the pan, with a handle about the common size. With this spade the men work backwards, turning the whole surface over about two inches deep, carefully observing to let none of the earth fall into the heart of the plants. After this hoeing, the plants may remain the winter, only remarking that provision should be made to fill up vacancies in case any should perish, and care should be taken to keep out cattle.

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About the latter end of the succeeding February, the plants should be again dug round as in August; and in May, when the plants begin to spindle, they should be moulded up, and the earth gathered round the roots to strengthen them in the ground against the roughness of the wind, when their stalks are loaded with heads. This done, nothing farther is necessary till the time for cutting; which is a work of time and skill, to be performed as the heads become fit, which is known by their blowing. And here it is to be noted, that the blossom appears near the bottom of the head in small, pale, blue flowers; and when those appear to have blown somewhat more than half way up, such head is fit for cutting, which is generally done in this manner; a man has a knife, the blade about two inches long, with a string in the handle, to put over the hand, and a pair of strong gloves to defend against the prickles. Thus equipped he goes along the furrows, and cuts with one hand and gathers with the other till he has as many as he can gripe; when cutting one about nine inches longer than the rest, he binds his bundle with that, and tosses it to some vacant spot to be carried, when he has done cutting, to the place for drying. In Essex they hang the bundles as they gather them on the stiff stalks of the plants, where they dry till the man goes home at night, which seems the most eligible method.

The manner of drying them is singular. Small poles about twelve feet long, with each a pin drove through it, fifteen inches from the ground, are provided in number proportioned to the quantity to be dried; on these poles the bundles are strung, and the poles being set up on end, the teasles are every way exposed to the sun and air to dry, observing to house them o' nights and in damp weather; and on days when it is fine, to bring them forth. Co-

vered sheds, where the air circulates freely, are the properest housings for these plants, and there the poles should be so placed as that the teazles upon one pole should not touch the teazles upon any other. When they are perfectly dry, they are then carried into some upper roof, that of a cow-house or out-house where cattle are fed in the winter, is to be preferred, because their breath is supposed to help to brighten the colour, and to make them tough in the hook, as the term is. Here they remain till after Christmas, the time when they are generally sorted out for sale. To do this, some roomy place is necessary, most commonly the barn-floors. Hither they bring the bundles which are untied one at a time, and generally divided into three classes. The largest heads, such as grow on the middle stems, are sorted for the first class, and called *Kings*; next to these are the side heads of which the second class, called *Middlings*, is composed; and lastly, those which by accident have received some small damage; these form the third class, and are called *Scrubbs*.

When a considerable quantity are thus sorted, they are made up in the following manner; the *Kings* are made up ten in a handful, six of the largest in the shape of a fan, with the four smallest placed in the bosom; these are neatly bound with a split withy, fastened by tucking in the end between the stems, which are generally left about nine inches long. When the *Kings* are all tied up in this manner, a sufficient number of split sticks, thirty inches long, and three quarters of an inch thick being ready prepared, twenty-five of these parcels are put in each stick, head to stem alternately, and then the stick is wreathed round the top with a withy, which keeps all fast, and forms no unpleasing figure. In like manner the *Scrubbs* are made up; but the *Middlings* are doubled by forming two fan-like rows of six each, and

and four in their bosoms on each side ; these are put into sticks of three feet-long each, thirty in a staff ; and thus made up, they are ready for sale, and are safely laid by in some convenient place for that purpose.

Thirty sticks of the first and third sort make a pack, but forty of the middlings are included in the same term.

C H A P. XXIII.

Of Hops.

PERHAPS there has been no plant introduced into the field culture, by which so much money has been gained as by Hops ; yet it may be a question whether Hops have been most advantageous to the planter or the factor. The precise determination of this question, as it only leads to guard the young planter against too sanguine an expectation of success, would be of little importance in a book of practical husbandry were it to be decided ; and, therefore, let this observation respecting the planter's gain suffice, that it will depend more upon his skillful management in failing years, than upon his plentiful crops in favourable ones ; for in friendly years, when the crops are in general plentiful, little is gained by the planter, and in years of general miscarriage, the great profit to some has its foundation in the loss of others ; so that upon the whole, another question may recur, whether, taking the body of planters together, the neat profit of this so much boasted article may be considerable ; this however is certain, that the public is benefited by it in two respects ; first, by a great addition to the revenue arising from the duty, and next by the sums saved at home, and chiefly expended in labour among the poor.

Hops require a rich, deep soil, rather inclined to moisture than dryness, naturally warm, but not sultry hot, and of a free and open exposure, not covered by hills, nor surrounded by woods; but rather low than high. The wide extended vallies where the hills insensibly rise at a distance with an easy ascent, is the desirable scite for a Hop plantation.

When a proper soil and happy situation unite, the planter then may proceed with spirit. Culture and the choice of plants will almost ensure him success. His first care should be to fence securely the spot he allots for his new plantation; and his next, the plowing or digging it to a proper depth. If it be meadow or fresh broken up ground, the swart should be first pared thinly off by a paring-plow, and then followed and buried by the furrow-plow at least ten inches deep; if arable, the ridges on which the Hops are to be planted, should be double plowed, or trenched with the spade, the latter method, though most expensive, is certainly the best. This should be done early in the winter, about which time the ground should be marked out on which the hills are to be formed, and on these spaces a thin coat of well mellowed dung should be laid to remain the winter. The vacant spaces have no need of dung, nor should any be used but such as is well rotted.

As soon after a hard frost as the earth becomes dry and mellow, plow into a three-bout ridge the lands on which your setts are to be planted, leaving the intermediate spaces unplowed. But before this is done, measure out your ground and square it, leaving the inequalities at the sides or ends to be managed as hereafter directed. By squaring it, I do not mean that all the sides should be equal, only that they be streight in order to add neatness and beauty to your plantation. The three-bout ridge should measure four feet nearly, and by leaving an interval of seven feet in breadth,

breadth, you will so manage, that your hills will all fall on the tops of the ridges, which will be of great advantage to your plants.

The ground being thus prepared and harrow'd down smooth, your next care is to mark out your hills. The readiest way of doing this, is, to have four painted sticks about six or seven feet long; two of which should be set upright with a plummet at each end, exactly at the distance you intend your alleys to be. Two men should be employed in this operation, each with an eight feet stick (for that is the distance I would advise your hills to be placed) and a spade. Supposing the men to beat the opposite ends, they begin one from one pole, and the other from the other pole; and each directing his eye to the pole that is exactly opposite to that at which he began, with his stick and his spade he measures the space from hill to hill, and throws up a spadeful of earth at each for a mark. In this manner both working alike, by meeting and crossing one another, they arrive at opposite ends nearly at the same time; and then measuring and moving their poles, they proceed again in the same manner, and so continue to do till the whole plantation is marked. In forming your alleys eleven feet will be found a due proportion.

This operation completed, let them next begin to prepare the mould for the hills, which I would advise to be skimmed lightly from the surface of the intervals or once plowed lands, taking that only which is perfectly fine, and gathering it into heaps; these should lie just opposite the holes out of which the spadefuls were thrown, and those spadefuls should be turned up and laid upon the opposite sides of the holes to where they lay when first thrown up. If frost or snow should intervene before the time of planting, stir the mould again, and throw it up nearer to the place where the plants are to be sett.

Thus every thing being in readiness before the month of March, especial care should be taken to provide a sufficient number of good setts, for which the young planter must rely on the fidelity of some friend, as he cannot himself be a competent judge by any directions that can be given him on paper. The number of setts that will be necessary for an acre, according to the method here directed, is 2500, that is five plants to a hill, and about 500 hills to an acre; according, therefore, to the number of acres you intend to begin with, must be the number of plants you provide; but I would advise the young planter to occupy but half the ground he intends for his plantation the first year, as he will by this method save considerably in the expence, as well as give himself time to enrich his ground for the future reception of his setts.

I should before have directed the ground to be plowed from south to north, that the open intervals might be as free as possible to the salutary air from those quarters, and defended as much as possible by covering one another from the east and west. For this reason, the Quincunx form of planting should be avoided, as it should be in all plantations where the distances are unequal. Where they are made equal in order to increase the number of plants, it certainly is the most eligible method, as it affords a more equal distribution of nourishment than any other method that can be devised; but in this case, as sufficient room is allotted to each plant over and above the additional space in the interval, protection will be more necessary than nourishment, as will be explained immediately.

By widening the intervals from south to north, the most invigorating rays of the sun has the freer access to every part of the plantation, and were the depth of it to be shortened in this direction, it would undoubtedly

doubtedly be of advantage ; what I mean is, that supposing an acre 22 yards wide, and 220 yards long, it were better that the length extended from east to west, than from north to south, for reasons that need not be repeated.

March, the proper month for planting, being come, the plants prepared, the ground moist, and the weather favourable, begin by filling up the marking holes, and just chopping the ground round them to loosen it, and then proceed to make up your hills with the fine mould already mentioned. This done, let the planter with his dibble make five holes in this manner, each about twelve inches a-part from the other, and rather inclining outwards towards the base of the hill than quite down-right, into which let him place his setts, which then will all point towards one another a-top, the use of which will more clearly appear hereafter ; this done, let him with his hand hollow the hill like a dish a-top, pressing the earth close to each plant with his dibble, and leaving the hole open for the reception of the first rain that falls. This done, let the two men proceed, one making up the hills, and the other planting till the whole plantation is completed. Then let them proceed to fill up the irregularities that may have happened at the sides or ends, and that with as much uniformity as may be, having a special regard to the distances observed in the body of the plantation, and placing the hills as conveniently corresponding as the ground will allow.

Thus having completed your plantation, you have little else to do till the weeds begin to appear, and then instead of hoeing, dig up your once plowed intervals, and throw the earth out equally on both sides, so as to cover the ridge on which the Hops are planted, and smother the rising weeds, this will add to the natural warmth of the soil, and help to enrich

number; if he has only two acres at first, two men and six women will be quite sufficient. He must likewise provide himself with two bins; these are only frames of wood, like the frames of the old-fashioned tables, about eight feet long and three wide, with four legs, four ends, and four sides substantially mortised together; to the inside of which is hung, all round, by loops on hooks placed on purpose, a canvas sheet, into which the Hops are dropped by the pickers as fast as they are gathered from the vines. In these sheets, when they are full, they are carried to the out, the expence of which for a few acres is very considerable. Some, therefore, make shift with a neighbouring malt-kiln; but that too perhaps being at an inconvenient distance, to supply this article at as small an expence as possible, let the following simple machine be constructed.

Make a frame of wood six feet square every way, Let the corner posts be ten feet high, and about three inches by four thick. Brace the whole firmly together, much in the manner of a cow-crib, the uppermost rail being almost five feet high, only the bottom need have but two transoms in the manner of a cross to keep the whole firm; this frame may be set upon wheels about two feet in diameter for the convenience of moving it about.

The frame being prepared, a tin kiln is next to be constructed of the following form: let a vessel in the form of a tunnel be made five feet high, two feet and a half in diameter at bottom, and six feet a top, the bottom to be well closed with a flat piece of tin, two inches above which in the form of a tap, let an iron pipe be fixed, such as is used with Dutch stoves to warm rooms. At top let there be a rim about six inches deep, within which a wire sieve with parallel wires, secured at proper distances with transverse wires, may be conveniently fitted, and let this vessel
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be placed upright in the frame, and well secured from moving. Over the rim of the wire sieve already described, which should be at least six inches deep, let a tin cover thirty inches deep be nicely fitted, but so as to be put on and taken off with ease, and let this cover have a false bottom perforated with holes as close together as may be consistent with strength, to fall upon the wire sieve, so as to leave only a vacant space of about half an inch between them; this bottom may be farther strengthened, with two iron rods of a convenient thickness, crossing one another in the manner that sieves to sift gravel are strengthened; the bottom of this cover, it may be observed, will be a little more than six inches above the lowermost edge of it, and over the uppermost edge should be fitted a second cover, with a rim twelve inches deep, exactly in the middle of which should be a perforated top, corresponding in every respect with the perforated bottom of the under cover. These covers should be made to fix by means of pegs and notches, the manner of which is well enough known. This second cover is only to be used when the under part of the Hops are judged to be sufficiently dried, in order that they may be all turned to dry equally. But the outermost rim of the under vessel must have an arched top, fitted to it exactly like the top of a chocolate-pot, with a smaller bowl at top, and a lid to play upon it, in every respect like the chocolate-pot, except in the size, which should be five inches in diameter. This top is to be put on and taken off by means of handles fixed to the sides of the bowl. It is likewise the cover. The under part of the wire sieve will want no removal, or only to be cleaned or repaired. This machine being so contrived will be so light, that when it is required to be drawn it may be drawn by a single man.

When the Hops are ready to be put into the drying stove is to be applied to the use of the

dermost vessel, and a coke or charcoal fire made in it just to warm the machine, and then a hair-cloth, ready prepared, is to be put over the wire sieve, the upper cover being not yet in play. When that is done, fill the under cover with Hops about three parts full, and then put on the arched top; increase the fire to a moderate heat, which may always be regulated, to what degree is requisite, by means of the blower; and when the Hops have pretty well done sweating, take off the arched top, fork up the Hops lightly, and put on the upper cover, first placing a hair-cloth nicely over the Hops, which in turning will fall between the Hops and the top-cover. Having in this manner secured them, turn them up-side down, which two men will do with great ease, by means of step ladders placed on each side against a rail mortised on purpose, at a convenient height into the corner posts. When the Hops are thus turned, increase the fire again to a moderate heat, and in less than an hour the Hops will be dried. When the coals are perfectly free from smoak, and the violence of the steam is abated, if the lid is clapt down the heat will be reverberated, and the trouble of turning precluded after the first or second kiln is dried off. In this small machine a great number of Hops may be dried in a-day; but, perhaps, it may be necessary, in order to prevent too great a quantity of warm air from passing, at the rims to cover them with cloths in the manner that is practised in drying saffron.

In gathering the Hops, the manner is, to cut the vines about two feet above the stock, and then with an instrument, called a dog, to raise the poles out of the ground, and to carry them to the binn, where laying them two at a time lengthwise, the women on each side, who are used to it, will strip them of their Hops in a very little time. Six women will keep two men fully employed in fetching and carrying
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away the poles, measuring the hops, and emptying and replacing the sheets, as above related.

It is of great consequence to have careful pickers, as well for the sake of picking the Hops clean, as for picking them neatly, free from stalks and leaves; and there is also a great nicety in preserving the Hops from heating after they are picked.

It is also of consequence to have oust houses handy to dry them quickly. Those who have large plantations of Hops, have sheds also built on purpose to forward the picking, to preserve the poles, and to furnish the pickers with convenient lodging, who, if they have but straw enough are not over-nice about their bed-fellows. In these sheds the pickers employ themselves till the dew is off in picking poles taken up over night; for, if the Hops be either picked when the dew is upon them, or when it rains, in either case they are very apt to become mouldy, or to be discoloured.

The common price for picking middling Hops is one penny a bushel, but if small three half-pence; to which in Kent they add apples, flour, and firing; in some other places gin, beer, and other encouragements.

After the Hops are picked, the next thing to be done, respecting the culture, is to strip the old vines, to clear the ground, and to shelter the poles, either by putting them in sheds, or raising them up in clumps of four or five hundred in a clump. This done, the young planter should take the earliest opportunity to supply the earth taken out of the alleys with a composition of fresh mould and dung, no matter whether rotten or not, because here it will have time to mix and rot, before there will be an immediate occasion for it. Its warmth, however, will have an effect upon the young stocks, though at a considerable distance, and when the ground comes
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to be sown in the spring, will cause them to shoot vigorously the succeeding summer. In this manner they may lie the winter, only care should be taken to keep up the hills by covering them with the old haulm.

Early in the spring, when the ground begins to put forth weeds, the whole plantation should be well plowed, or horse-hoed, and the hoeing repeated. In Kent they have a very expeditious way of performing this labour, by means of an instrument variously shaped, according to the humour of the planter, with many firebrake iron tines about an inch square, made webbed; I am persuaded, however, that though time is saved by the use of this instrument, yet no essential advantage is obtained by the use of it, as one deep plowing or hoeing with the common plough, is of more real service to the plants than several repeated hoeings with this instrument, which cannot by its construction penetrate so deep as to reach the soil, from which they derive their nourishment. Be that, however, as it may, if the plantation is well plowed in the manner here directed, and again cross-plowed when the weeds begin to shew themselves a second time, the planter will find his account in it. It is no unusual thing in Kent to intermix in their hop-gardens, filbert-trees, by which they make a considerable advantage by supplying the London markets. This, however, I would by no means recommend. Hops are of themselves so advantageous a crop when they succeed, that nothing should be added to impede their growth, and in crops that require so considerable a quantity of moisture as Dr. Hales has demonstrated in his *Vegetable Statics* the Hop vines do, whatever may be supposed to rob them of that nourishment, must infallibly injure them, though, perhaps, imperceptibly to the eye of the owner, who may think that all
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that he receives for his filberts may be clear gain, when in fact the raising of them may be the ruin of his Hops.

As soon after the first plowing as the vines begin to appear, care should be taken to examine and dress the stocks, and wherever any rottenness or canker appears, it should be carefully cut off, and all those superfluous vines pruned away, that, were they suffered to remain, would serve only to weaken the stock and injure the vines.

The next care of the planter is to plant and secure his poles, to regulate and direct the vines to avoid crossing, and to cut out such as are untowardly, and do not take kindly to creeping. Some find it necessary to bind them to the poles when they are inclined to straggle; but these unkindly plants are seldom good bearers, and when they discover such a disposition early enough to be replaced by others, replacing them should never be omitted. Great care should likewise be taken in revising the poles before they are planted, lest any canker, rottenness, or foulness has diseased them; for that will most certainly infect the vines that encircle them. These little niceties require an unremitting attention; but, if diligently observed, will enrich the owner in the end. Let it, therefore, be a caution to all who are inclined to become adventurers in Hop planting, not to attempt it, but upon a naturally deep, moist, rich and fertile soil. Being possessed of such a soil, be careful to prepare it well, to plow it or dig it deep, and mellow it by exposing it to all the vicissitudes of the seasons before planting, to dung it moderately, to procure the best of plants, and to keep it well pulverised and free from weeds after planting; to deepen the soil as much as may be; to enrich that which is impoverished, and to keep off all annoyances, and believe me, whoever observes these instructions, notwithstanding

notwithstanding the growth in general exceeds the consumption, will increase his fortune, as he increases his plantations, provided the profit he makes of his good land does not tempt him to employ indifferent land in the same way.

It remains now only, in order to render this article complete, to speak of the manner of managing Hops after they are dried till such time as they are fit for the market.

When the Hops are sufficiently dried, they must be carried into some dry room, store-house, or other entered place, and laid in a heap on a boarded floor, to recover a kind of humidity from the air to supply in some measure the moisture of which they had been deprived by drying. Of this place notice must be given to the officer of excise, for the division in which the Hops grow, as well as of the kiln for curing, and of the quantity of acres that each planter has growing; and this must be done on or before the first day of August in every year, and no Hops must be lodged after picking in any unentered place, on very severe penalties; forty-eight hours notice must also be given to the proper officer before bagging, which officer is obliged to attend to take the weight, ascertain the duty, and mark the bags. Ten *per cent.* is allowed for prompt payment, and ten *per cent.* for tare of the bags, &c. The space of six weeks is allowed for curing, and six months for paying the duty, if required; but it should seem that a sufficient quantity of Hops must be left in charge to answer the duty, as a security for the payment of it.

The manner of bagging is somewhat curious; after the Hops are ready, the bags prepared, and the Excise Officer present, a little trap-door made on purpose in the floor of an upper loft where the Hops are laid, is opened, and the mouth of the bag is drawn up, opened, and two or three inches of it, rolled

rolled upon a hoop a little bigger than the trap hole, the bag is then drawn down close, and begun to be filled, and when a certain number of bushels are thrown in, they are followed by a man who treads them and with a weight in his hand rams them close.

The bag does not reach the floor underneath, but is suspended by the fore-mentioned hoop, which the heavier the bag grows by filling, the tighter it is held by the hoop, and the man continues treading till he comes even with the floor, then the bag is eased a little, untwisted from the hoop, let down gently, and suffered to rest upon the floor till it is sewed, tied tight at the four corners, weighed, and marked by the proper officer.

In Ireland they have discovered that Hops will grow well in boggy soils; but the bog must be first thoroughly drained by a surrounding trench. The process is expensive, as much of the boggy earth is to be carried off, and an equal quantity of rich earth to be replaced in its room. This rich earth is to form the hills on which the Hops are to grow, and this being known, the management is in every other respect the same as before directed.

C H A P. XXIV.

Of Saffron.

SAFFRON being so universally used, and the culture of it so well known in particular parts of this kingdom, and the English Saffron having besides the preference of every other kind, it is greatly to be regretted, that its culture is not more generally extended. One reason indeed may be, the difficulty of training up hands, in this age of general dissipation, profligacy, and idleness, to weed, gather, and manufacture this delicate plant, which requires early attendance, some expertness, and a careful attention

to prevent waste, properties not to be generally expected among the lower class of people, who, as the law stands at present, seem rather to place their chief dependance upon the parish bounty, than upon their own honest labour for their support, and this is and ever will be an insurmountable bar to all field improvements, while the law continues to oblige parishes to maintain in idleness all those who will not work to maintain themselves.

That this is the case at present is evident to demonstration, by taking a survey of the many poor-houses throughout the kingdom, the greatest number of whose inhabitants are as well, or perhaps better able to work for themselves, than many of those are who are obliged by law to pay to their support.

But be this as it may, it is the business of the husbandman to learn the culture of every useful article, as it is not impossible but that in the vicissitude of human affairs, the cultivation of useful plants may take place of the cultivation of articles now more in demand. For the time may come, and it does not appear to be at any great distance, when half the arable lands in England must be converted to other purposes than that of raising bread-corn, as half the lands well-cultivated will be more than sufficient for the sustenance of our own inhabitants.

The soils most proper for Saffron are not easily described; a fine friable loam, or a mixed sandy soil between white and red, tempered with a hazle mould of an indifferent fatness, are the soils on which Saffron may be expected to yield the greatest profit; but, Ellis says, it will thrive well on any kindly, light, dry soil, provided it be deep, well tilled, and well manured; but this, however, is very problematical, as attempts have been made to cultivate it in such kind of soils, but without effect. Fresh broken up ground is most desirable, but even that must be of
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the sort first recommended, and made perfectly fine by the spade or plough. There is no plant we know of so choice in the soil it delights in as Saffron.

I would, therefore, by no means recommend large undertakings in this way at first setting out. Small trials to learn the properties of the soil, and to gain by degrees a perfect knowledge of the process, is by far the most prudent method of proceeding. A similitude of soils is not always an indication of a sameness of qualities. There are many particular spots on which some kinds of plants acquire an excellency not to be attained in any other; not from any superior way of management, but from the nature of the soil itself. No plant is more susceptible of this distinction than saffron, and therefore it is, that I advise a trial of the soil before any considerable expence is bestowed in forming a plantation.

Let it be a caution to all who would cultivate saffron, not to attempt it but on a kindly soil, easily made fine, and not liable to cake or bind; such a soil made perfectly mellow with rich manure and tillage, and set out in beds of four feet wide, will be fit to receive the setts of Saffron about the middle of June.

These setts are the bulbous roots taken up from old plantations in order to form new, as they never replant them upon the same ground in less than seven years. They are to be purchased by the quarter about the time of planting, and those that are the largest and roundest are accounted the best. The manner of planting in Cambridgeshire, where the largest plantations are at this time cultivated, is by forming of drills with a particular kind of spade-like instrument about four inches wide, with which a man casts up the earth very dextrously from one row, and is followed by two women who place the setts upright about four inches a-part at the bottom of that

row, and when the man returns he covers the plants in the first row with the earth which he throws out of the second; and thus they proceed, leaving every 12th row unplanted for an alley to accommodate the weeders, and for the convenience of gathering the flowers without treading down the plants.

To people unaccustomed to this manner of planting, the labour would seem endless; for it is computed that no less than 392,040 setts go to an acre. As these setts stand as near as the planters can guess at about four inches distant from each other every way, no instrument can be formed to facilitate the labour, because the setts must all be planted upright, and must in that position be carefully covered.

The price for setting and covering an acre is estimated at no more than six and twenty shillings in the neighbourhood of Saffron Walden.

As the plantations there are generally made in common fields, the fencing costs more or less according to the size; from one to three acres is the common run.

From the time of planting till the beginning of September very little more is necessary to be done than keeping down the weeds: at that time, the heads begin to shoot, and then the ground must be carefully loosened, the weeds raked off, and the beds cleansed.

About the beginning of October the flowers begin to blow, and then a company of gatherers are got together, who disperse themselves all over the plantation, and pull off the flowers as fast as they appear. This is done early in the morning in wet weather or dry; for as the day advances the buds close, and then the gatherers return home, carrying with them in baskets the produce of their morning's work. These they immediately spread upon a large table and begin to pick, separating the chives from
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the green leaves, preparing the former for the kiln, and carrying the latter to the dunghill. Next morning they return to gathering, and repeat the same process till all are gathered.

The kiln is a moveable machine of a very simple construction. It consists of an oaken frame, twelve inches square at the bottom, two feet high, and two and twenty inches square at top. This frame is mortised together at top and bottom, and lathed and plaistered inside and out, all but the top, which is latticed with wire, over which a hair-cloth is strained for the purpose of drying the Saffron; a hole is left in front for putting in the fire. To this frame are added a square board and a weight, which are occasionally made use of in the action of drying. The hole in front is four inches above the lowermost rail of the frame, and the floor is plaistered thicker than ordinary to serve for a hearth. The ends of the hair-cloth are fastened to rollers which serve as strainers, and sometimes, instead of a hair-cloth, a sort of thin flannel is made use of; but so great is the nicety in drying, that if the greatest attention is not observed in this operation, the Saffron is apt to scorch, and then it is utterly spoiled.

When a quantity sufficient to make a cake is gathered and picked, they prepare for drying it by heating the kiln, and placing five or six sheets of clean white paper over the hair-cloth, upon which they spread the moist Saffron about three inches thick, covering it at the top with the same number of sheets as is placed to support the bottom, and then with flannels five or six double laid upon the papers, they keep in the steam till the Saffron begins to sweat. At that juncture they fit on the board, and over that place the weight. This increases the heat by closing up the crevices, and now is the dangerous crisis, lest the too great heat should consume the paper, and by that accident set fire to the Saffron. In this situation, how-

ever, it is suffered to remain but a short time. When it is moderately pressed into the form that is intended, the weight is removed, and the flannel neatly folded up like a table-cloth a-top, the sides of the cake trimmed, and a thin sliding board passed in between the hair-cloth and the paper that covered it, and then by removing the flannels, and clapping on the upper board the cake is turned upside down, the board slipped from underneath, the flannels again put on, the board and the weight added as before, and the heat continued. These operations take up at least two hours, after which the fire is abated, the cake again turned, a gentle heat continued, and the cake which has by this time acquired a consistence, turned every half-hour till it is thoroughly dried and made fit for sale.

Towards the latter end of the gathering season, when the flowers begin to be less succulent, they sometimes use linen moistened with small beer instead of paper, in order to make them sweat kindly, without which the cakes never obtain a true consistence.

The fuel they use in drying is the same as for drying malt, charcoal in the country I have been speaking of is in general use.

The season for gathering continues about a month; in favourable seasons they account 12 or 14 lb. of undried Saffron upon an acre a middling crop for the first year, the second year 40 or 50, and the third year 60 or 70.

The Hon. Mr. Ch. Montague has estimated the profit of an acre of Saffron at 20 l. but Dr. Douglas with more accuracy has reduced it to 5 l. In some years and in some plantations there will be more than this difference in the price; for in some seasons Saffron is sold for 30s. a pound, in others for 3 l. but upon all such occasions the average is to be taken, and not the partial profit. There is a remarkable disproportion in the weight between the undried Saffron and the dried, four, five, and sometimes six pounds of the

the former go to one pound of the latter. There is one general error committed by the cultivators in the management of their Saffron, and that is, suffering the beds to run to weeds in the spring, and their cattle to graze them. Were they to be at the expence of hoeing and afterwards of mowing the Saffron grass at the proper time, I am persuaded, their profit would be greater in the end; but the custom is in that part of the country to let a certain portion of land to the poor families who have been accustomed to raise Saffron, and they proceed in the old course without the least notion of improvement.

After three crops have been obtained, the roots are then to be forked up, and this is generally performed about the following Midsummer, that being the proper time of forming new plantations. This is a very expensive article, but the excess of roots very nearly pays the extra charge. An acre which required 16 bushel of roots to plant it, will produce four and twenty bushel if carefully gathered up; but as women are generally employed in this service, they must be sharply looked after, or they are apt to be slovenly. Some, to save expence, have plowed them up, and hired fifteen or sixteen women to follow the plough, and have found their account in so doing.

About this time of the year great quantities of roots are brought to market; but generally the best are kept for the planter's own use. Many of the caroty roots were formerly sold; but now none are offered, as every one knows they are good for nothing. Great care is taken in dressing the roots as soon as gathered, by cleaning, rubbing off excrescences, separating the old remains from the new heads, and excluding the long misshapen renagades, which they call Spickets. The common price is from 8s. to 10s. a bushel.

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The people employed in raising Saffron are generally poor, and yet were the culture of it properly carried on, great profit would certainly attend the undertaking. At present the farmers find it their interest to let small parcels of land to the planters, who by dunging and hoeing enrich the soil for future crops of corn, which otherwise would be worth little. Farmer Ellis, says, that about the two Restavans, where the best Saffron grows, their lands are of a whitish cast with a chalky bottom, and that, were it not for this improvement, it would not be worth more than four shillings an acre, though now it is lett for twenty. The value of this culture is best estimated from this, that a whole family is frequently maintained by renting an acre or two of land, and planting it with Saffron, and the reason may be because that quantity finds employment for young and old during a considerable part of the year; and the price of labour, added to the profits of the plantations, affords them all a tollerable support.

C H A P. XXV.

Of Flax.

WE pay annually immense sums to the Russians and other foreign states for Hemp and Flax, and yet I have been informed by an English manufacturer of undoubted credit, that these articles raised at home are intrinsically better than those imported from abroad.

One disadvantage that seems to retard the progress of their cultivation in this country is, the want of convenience for watering. The rivers abroad are all open for that purpose, but ours are shut up for fear of destroying the fish. Springs of water to fill canals are not always at hand, and ordinary ponds are very unfit for the purpose, yet without the convenience

convenience of water, Flax cannot be raised to advantage. An article, however, so useful to the manufacturer, and at the same time so profitable to the planter where all the necessary requisites concur, must not be omitted in a treatise of practical husbandry.

The following directions are the more to be depended upon, as they are in substance the same as those drawn up by order of a respectable body of commissioners, with a view to encourage and extend the cultivation in a neighbouring kingdom, since the publication of which great quantities of Flax have been raised in Scotland.

In the choice of soil the skilful Flax planter prefers a free, open, and dry exposure, a fine, crumbly, deep loam, or a fresh-broken up rich pasture ground.

New-broken up lands produce the best crops of Flax, and the freest from weeds, provided they are brought to a proper tilth: but Flax-seed should never be sown on earth that is not perfectly fine, and of a proper moisture; the crumbly garden-mould is the pattern that is to be followed.

The soil being suited, the seed is next to be examined; that which is heaviest and brightest in colour is the best; that which, when bruised, appears of a light or yellowish green, and fresh in the heart, oily, and not dry, and smells and tastes sweet, may be depended upon. Fresh Dutch seed is preferable to all others for the climate of Britain; that of Russia for the climate of Ireland. Three bushels of Dutch seed is quite sufficient for one acre, and the time of sowing it is from the beginning of March to the middle of April, upon a well pulverised dry tilth.

If weeding is necessary, that operation should be performed when the Flax is about four or five inches high, and then the weeders should have only stockings on without shoes; some, indeed, let in sheep among their Flax, but this should be cautiously done;

done ; for though they will eat off the weeds, and leave the Flax, yet their trampling is sometimes very hurtful to it. Their lying upon it, however, is confessedly advantageous.

In pulling the Flax great attention is necessary. If it is short and branchy it should not be pulled till the seed is ripe, for that will be the most valuable part ; but, if it is tall and slender, the seed should be disregarded, and the Flax only kept in view. Just after the bloom is fallen is the proper time to begin pulling. In Ireland the degree of brownness is their chief direction.

When Flax is lodged, as often happens, that which lies upon the ground should be pulled, tho', perhaps, not yet arrived at maturity, otherwise it will rot, and be wholly useless.

When a field ripens unequally, that which is ripe first should be pulled first ; and what is unripe should be left standing till it ripens.

The greatest nicety in the whole process is to sort it properly, observing, that what is long and fine be kept together ; that which is long and coarse the same ; and so of the short and fine, and short and coarse. If this caution is neglected the planter will be a great sufferer.

In pulling the Flax, the pullers must be careful to cross the handfuls, as well for the advantage of air, as for the convenience of the ripplers.

Flax that is saved for the sake of the seed is frequently stacked ; in that case, it is put up in shocks, and dried like wheat or other corn. If for the lint only, its own moisture is of importance in the watering, and it should be watered before that moisture is exhausted. But before it is watered, it should be ripped to comb off the crops, or seed-heads, which if put into the water along with the Flax will spoil
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the water. The handfuls should not be large, or they will endanger the lint in the rippling comb.

Soft water let into a canal or trench by the side of a running stream, and there kept separate by means of a sluice, is the proper water for watering Flax. It should in this condition be kept a month or five weeks exposed to the action of the sun, in which time innumerable tribes of insects will be generated in it, and will begin to discover signs of life by blowing up bubbles of air upon the surface; till these signs appear, the water is yet too cold, or is otherwise unfit for the watering of Flax. The proper season for this operation is from the time of pulling to the time of completing the process. In Ireland no such regard is paid to the water; they water in any bog-hole.

Before it is put into the water, it is to be tied up slackly in little sheafs about the size of the double grasp of an ordinary man, observing, as is said before, to sort it properly before it is bound up.

The sheafs should be put into the canals sloping, with the crop ends-inclining downwards, but care should be taken that the whole body of the sheafs is immersed in the water, and that no part is suffered to touch either the bottom or sides, but that the whole continue suspended till the end for which the Flax is immersed is accomplished; it is besides necessary that the sheaves be covered from the sun in the water, otherwise the Flax will in some places be discoloured. The covering usually made use of in the Flax countries is green turff, which is laid on heavier or lighter according to the buoyancy of the sheaves; every day makes some small difference in this article, and every day the covering requires to be diminished. This more than ordinary nicety in the watering, may be one probable reason why the Scotch linen wears longer than the Irish, who do not seem
so

so nice in this article. In ten or twelve days, sometimes in less, the Flax will be sufficiently watered, which is best known by taking a plant out of the middle of one of the sheafs, and if the lint in the middle feels soft, and the husk that surrounds it brittle, it is then watered enough. The planters are very watchful in this particular, as watering too much or too little is equally against their interest.

When they find it watered enough, they take it carefully out sheaf by sheaf, rinsing every one as they take it out to cleanse it of the slime and filth it may have contracted by lying.

After all is taken out fresh Flax must not be laid in the same water, but that in which the Flax was steeped must be run off, and the canal cleansed, and fresh water supplied.

It is observable, that the coarsest Flax is soonest watered, and must be taken out some days before the finest, which shews the necessity of sorting before watering as well as after.

When the Flax is taken out of the water, the next operation is grassing; and in this some are more nice than others; short heath is the best bed for grassing Flax upon, as when the Flax is wet it fastens to the heath, and is thereby secured against the ravage of winds, and it has besides another advantage, that it admits a more equal circulation of air than any other bed; next to heath, is dry, bare, downs, or lees; but grassy meadows are absolutely to be rejected. Flax in grassing cannot be spread too thin; but care must be taken not to expose it in rainy weather, while the rind is soft and tender; but when by the action of the sun it has acquired a firmer consistency, the showers, instead of hurting it, assist the influences of wind and sun in fitting it to part from the body.

Even

Even in grafting, there is a particular knack not to be overlooked ; and that is, in placing the rows the spreaders always begin opposite to the quarter from whence the most violent winds are generally observed to blow, and placing the root-ends foremost, they make the root-ends of every other row lap over the crop-ends of the former row three or four inches, and when they come to the last row, they stake that down with a rope, as they do likewise the first row.

A little experience will soon teach the planter the signs of the Flax being grafted enough ; it is of a clearer colour than before ; the rind is blistered up and become very brittle, and is more easily disposed to part from the body of the Flax than in any former state ; and it is in every respect drier and in a better condition for keeping. A dry calm day should always be chosen to gather up the Flax, and to tie it up for housing. In doing this, care should be taken to tie it up in small bundles as nearly corresponding in length, colour, quality, and size, as the eye of the binder can distinguish.

When it has undergone this latter operation, the planter has then done his part ; he is only to take care to house it and keep it in some dry barn or other outhouse till he can dispose of it, which he may readily do in all places where the linen manufactory is now carried on. Indeed there are many farmers in Scotland and Ireland too, who just raise enough to supply their families with shirting and sheeting ; these send it to the scutching mills, and then to the Flax-dressers, from whence they have it returned fit for spinning at a very trifling expence.

C H A P. XXVI.

Of Hemp.

EVERY manufacturer of English Sail-Cloth laments the backwardness of the English farmer in raising Hemp. Yet the culture of this plant is neither so difficult, nor the manufacturing of it so troublesome as that of flax, of which we have treated in the foregoing chapter.

By some fatality in the ministerial policy of Great Britain, little attention is paid to those articles of national produce that are most essential to national security. The growth of oak and the growth of Hemp are surely objects of the last concern; yet where are the national encouragements for planting the one, or cultivating the other.

Were these articles peculiar to any foreign climate, or were their quality superior, and they could be imported from abroad better and cheaper than they can be raised at home, in the view of a commercial nation we might be justified in the disregard shewn to their propagation; but when it is universally acknowledged, that both the English Oak and the English Hemp are the best in the world, what can be said for that policy which is only employed to destroy, without any provident care to restore those necessary materials, without which we cannot long exist as a free and an independent people.

If by the change that has happened in our manner of living, Gentlemen of moderate fortunes, so far from being in a condition to employ a part of their estates in planting of trees, from which they can never hope for any return, are many of them obliged to cut down those they have already growing before they arrive at their full perfection, should not government

vernment be careful to provide against the effects of such manifest waste, and either immediately or remotely contribute to the propagation of others before the old store is too far diminished.

On the other hand, can a wise and provident administration look forward to the formidable improvements of a people but just emerging from obscurity, and behold them equipping fleets and forming a rival naval power, that one day may be employed in a contention against ourselves, without considering how necessary it is for Great Britain to render herself independent of any power upon earth for the equipment of her navy. At present she has neither cordage nor canvas to do this, nor materials wherewith to make them without being beholden to Russia for a supply. Should Russia by her increasing demands at home, or by a policy common to all wise states, who rise into greatness from small beginnings, think it her interest to withhold from us those materials, without which we can neither defend ourselves nor annoy our enemies, where could we lay the blame? not upon Russia, because every people have the right, while they maintain the power, of converting their own productions to their own emolument. Not upon our climate or situation, for those are the happiest in the world, and afford us the means of supplying ourselves at home with every thing necessary for our use, as well for defence as convenience. Where then must the blame be laid, but upon those who having the government of a great kingdom entrusted to their care, regard only their own aggrandizement, and that of their creatures and dependants, without looking forward to posterity, and giving encouragement to the present generation, as far as human foresight can be presumed upon, to provide against the wants and exigencies of the next.

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It is not from ignorance, that our great men in office have neglected to submit this great object of national security to parliamentary consideration. A worthy manufacturer of Gainsboro' in Lincolnshire, who is now no more, made it a part of the business of a long life, to endeavour to turn the attention of successive administrations to the granting an adequate bounty to the husbandmen who should embark with spirit in the culture of Hemp. He was at great pains and expence to convince his superiors by many repeated trials and experiments of the superiority of British Hemp, both as to strength and facility of working, when properly manufactured, over that imported from abroad; and to assure them that nothing was wanting but encouragement to excite emulation, to carry that branch of English agriculture and its dependant manufactures to the highest pitch of perfection. He pleaded for Britain, but pleaded in vain. Ministers of the first rank gave him the hearing, but paid no regard to his advice. He died, lamenting the fatality that seemed to him to threaten his country.

There is no soil in which Hemp will thrive so well as in fine, fat, rich, black-moulded sand. Indeed there is hardly any soil so little addicted to weeds as that I have now described. Dung is by no means necessary to the growth of Hemp, but good tillage and a suitable soil is absolutely so; the mould should be deep and easily penetrated, for the fibres of the roots are soon checked, and if impeded are no longer capable of performing their proper offices. There is great nicety required in the choice of the seed, and much is told that is good for little. The method by which those who are conversant in Hemp-seed judge of its goodness is by its weight, its colour, and its gloss; if it is heavy, bright, and of an oily-like glossiness, there is no doubt of its goodness, provided that no mixture is found amongst it. What
is

is most to be apprehended, is from a mixture of immature seed, which has all the appearance of good seed, but has never been properly impregnated. For as Hemp is male and female, one bearing the farina, the other the seed; and as the male is ripe much sooner than the other, it frequently happens, that the male is pulled before the seed of the female is properly fecundated; in which case, though the seed is in appearance perfect, yet it is only a mere husk without any prolific powers. The seed, however, that comes from the Baltic, provided it is fresh, is generally good; but dealers are very apt to mix it, or to push off their old seed upon those by whom they cannot be detected.

The whole month of April is the proper season for sowing of Hemp.

Hemp is so great an enemy to weeds, that some farmers of no mean esteem for knowledge in their profession, sow Hemp upon their rank growing soils on purpose to subdue them. Upon these soils, and, indeed, upon every other, a great quantity of seed is sown, no less than three or four bushels upon an acre, which, when it rises and branches out, covers the ground so thick, that every weed is choaked that cannot keep pace with the Hemp in its growth. Docks, sowthistles, thistles, and other rank growers, should be hoed out, or plucked up while the hemp is in its infancy. In that state, it may be trampled upon, and even rolled; but when it begins to branch, it should be left to itself. Indeed, in very dry seasons, if watering is practicable, Hemp should be watered, for which reason, the soils that suit it best are those contiguous to lakes or slow running waters. It requires a continual supply of nourishment, but, at the same time, that nourishment must be tempered with a proportionable degree of heat. Mr. Miller advises hoeing as soon as the plants begin to appear,

and also thinning like turneps. Dr. Hill advises the horse-hoeing culture, and with some shew of reason; for as in Hemp there is always a double harvest, and that in the first, one part of the plants is to be pulled, and the other left to ripen, his opinion is, that the intervals between the rows give room for that first operation to be performed with the least waste possible; and it must be owned, that where the plants grow promiscuously, as they do in Hemp, a multitude of the latter ripe plants must be trampled down and destroyed in the pulling up of those that are first ripe. Hemp, therefore, appears to me to be one of those plants to which the practice of the New Husbandry ought to be applied.

The first indications of the ripeness of Hemp, are the same with those that are observed in flax. The male or karle Hemp always ripens first, and about the middle of August begins to drop its leaves and to turn pale. When this becomes general, then is the time to begin pulling; but the cautious planter will not trust to these signs only, but will examine the seed vessels, and be sure that all the plants have shed their male dust, otherwise the seed in the latter crop will suffer considerably.

The pulling of Hemp differs in nothing from the pulling of Flax, except in the care of selecting the males, and of preserving as many of the female plants as possible unhurt. Hemp is made up, stooked, rippled, watered, grafted, and dried exactly in the same manner as has been before directed for flax, only the bundles are made up larger, and should measure a statute yard in circumference.

As the season is generally very far advanced before the female or simble Hemp [as it should be called] has ripened its seeds, another method of drying is frequently necessary. Abroad, I am told, they have a kind of ovens built on purpose for that use.

but here the planters content themselves with erecting a kind of scaffold, covered with hurdles, over which they spread their watered hemp to a moderate thinness, and then kindling a slow turf or peat fire underneath, they keep turning the hemp till it is sufficiently dry, after which they preserve it by stacking till it is threshed; then the planter's care is over, and he delivers it into the hands of the manufacturer, whose various processes it were foreign to the design of this work to recite.

C H A P. XXVII.

Of Weld.

THIS valuable plant is, perhaps, the easiest propagated of any other. It will grow on almost any dry barren soil, but Mr. Miller says it will rise in value in proportion to the richness of the soil upon which it is sown: Mr. Haughton, who recommended it to the notice of the English husbandman near an hundred years ago, says, it then grew wild, and might be cultivated to advantage on any *ordinary or barren dry warm land*. Dr. Hill says, it now grows wild all over England; and farmer Ellis, who cultivated it, says, that it will thrive on gravel, gravelly loam, dry loam, chalky or sandy soils, and that too with ordinary tillage, and without manure. In the neighbourhood where I live, I have seen it cultivated by one of the best Kentish farmers the country can boast, but with no very extraordinary success.

The common way of cultivating this plant for the dyers use has been by sowing it with barley or oats; but farmer Ellis recommends what he calls a *new improvement*; and that is, to sow rape, turnip, and weld together, a mixture that to me appears preposterous. On the contrary, Mr. Miller endeavours to persuade the farmers to sow it alone in August, on a

good clean tilth, and about the latter end of June or beginning of July following, to pull it, when, he says, the plants will be in the highest perfection. And indeed, after an early crop of pease upon poor land that will not grow wheat, this is no bad practice; but few farmers, I believe, will be induced to appropriate a good clean tilth after a summer's fallow to the growth of weld, which, however profitable it may have been represented, has never been found equal in value to a good crop of wheat.

Mr. Haughton says, "it may be sown *immediate-*
 " *ly* after barley or oats are harrowed in, and when
 " they are covered, the weld requireth only a bush
 " harrow to be drawn over it. A gallon of seed will
 " sow an acre [a quart is sufficient]. It groweth
 " not much, he says, the first summer, but the
 " next summer you may expect a crop. Take care
 " to gather it in good time; for if *over-ripe*, the
 " seed will fall out; if *unacr-ripe*, neither seed nor
 " stalk will be good. It is pulled up as they do
 " flax, by the roots, and bound up in little hand-
 " fels, set to dry, and then housed; after this they
 " beat out the seed, which is of a good value, and
 " sell the roots and stalks to the dyers; and it is of
 " singular use for dying the bright yellow and le-
 " mon colour.

It were needless to add any thing to this concise account, as every one knows the method of preparing the land for oats and barley; and nothing more is required for weld. If the ground has been fallowed and dressed for barley, a wheat crop may succeed the weld the year following; if it has not, no better preparation need be made for a succeeding crop of oats.

Some have asserted, that this drug thrives nowhere so well as within five or six miles of the sea, and have recommended a mixture of moist sea-sand

to be sown with the seed, which is exceedingly small, as well to assist in separating it, as to increase its growth. How far this may be true I cannot assert; but there are plants that are known to prosper best within the influences of the sea breeze, and yet will not thrive when exposed to the full aspect of the sea. Perhaps weld may be added to the number.

C H A P. XXVIII.

Of Wood.

OF the culture and management of this plant, I can find no *perfect* account in our books of husbandry. With regard to the soil and the preparation of the land, all writers agree, that the richest soils, and the best culture, are absolutely necessary for the growth of it. It differs in almost every respect from the plant before treated of; it is a large broad-leaved plant, that requires abundant nourishment, and that too of the richest kind; the fine, deep, friable black mold, that is sometimes to be met with near great towns is the soil that suits it best, and for this sort of land the undertakers who travel from county to county to rent land, will give almost any price. Their method is to travel in gangs, and to settle themselves from the time they take the land till their term is expired in the neighbourhood of their new plantation. They begin about Michaelmas to prepare the land, and get early ready to sow the seeds. A gallon of seed is generally sown upon an acre; but much less is necessary. If the weather proves fine in February they begin to sow; but first the land is made perfectly fine by a close tined light harrow; the seed is then sown, and lightly harrowed in. No crop is more liable to be destroy-

ed by the fly than this ; but sowing early is of advantage in preserving it, as the fly seldom begins its ravages early in the spring.

When the plants begin to appear, their method is, to weed them ; they do not attempt to hoe, for fear of lessening their crop ; but as soon as the plants begin to shoot vigorously, they nip off the bud of the upright stem to increase the leaves. About the beginning of June the first crop is generally ready to gather, which is best known by the fulness and plumpness of the leaves, which then begin to shew of a pale green. This work must be performed as speedily as possible, and is done by twisting off the full-grown leaves in like manner as gardeners gather spinnach. Those leaves must immediately be sent to the mill, and being ground, are with their juice made into balls and dried in the open air.

In a fortnight after the first gathering, a second gathering will be ready, and these must likewise be sent to the mill and ground in the same manner.

Those two gatherings are kept separate from the future gatherings of the same year, and are afterwards mixt and ground into a fine powder, which being laid upon a floor like malt, is watered, heated, and fermented till it changes into a bright black colour, and then it is fit for the dyers. Its chief use is in fixing the colours, and is much used by linnen printers.

Woad has nothing very particular in the culture of it ; it certainly might be raised to great advantage, by planting it in drills twelve inches a-part, hoeing it, and keeping it free from weeds ; but the great art is in preparing it afterwards, which the woadmen keep a secret to themselves. The process is both laborious and expensive ; but sometimes the undertakers make great profit. This however, like every other crop that depends upon the season, is liable to mis-

milcarriages, and what is gained in one year is often lost the next. Weld is a biennial plant, and is seldom suffered to perfect its seeds till the second year; as the stems of it grow to a great height, they are reaped like wheat, bound up, stooked, housed, and threshed in the same manner. Dr. Hill says, that an acre will sometimes produce fifty quarters of seed; and farmer Ellis adds, that an acre commonly produces a ton of the green herb, and that a ton after it is manufactured is worth 30*l*.

There is, perhaps, no plant more capable of improvement than woad, but the management of it is but little known among husbandmen. Many of the Kentish farmers sow weld, because it is very easily cultivated; it grows upon any kind of land; wants no extraordinary care in the drying or housing, and is managed in every respect with as little trouble as clover; but woad is of another kind; it is neither sowed upon ordinary soils, nor gathered in the common manner; and it requires a particular kind of manufacturing, with which husbandry servants are wholly unacquainted; and yet Dr. Hill says, it is a plant of easy culture, subject to few accidents, and thinks it pity it should be cultivated in so few places.

C H A P. XXIX.

Of Madder.

THE root of madder, as Mr. Dossie has well observed, is a capital drug used in dying wool, linen, and cotton, and indispensibly necessary in the manufacture of printed calicoes. Its effects are so very powerful as not to be confined to substances immediately under the direction of the manufacturer. It

It will change the very bones of animals that feed upon the refuse from white to a purplish red; as every callicoe printer can attest.

The cultivation of this plant is undoubtedly of the utmost consequence to one of the most flourishing branches of the British manufactory, and the rather; as the Dutch some years ago observing the rapid progress that the manufactory of printed linens and cottons was making in England, raised the price of it considerably; and Gum Senegal being at the same time almost wholly engrossed by the same people by reason of the prohibition of commerce between England and France on account of the war, they advanced that drug also to such an exorbitant price, that what our linen printers were wont to purchase for 30s. rose before the end of the war to 12 and 15l. And what was still more distressful to our manufacturers, this exorbitant advance afforded so fair an occasion for fraud, that very little came over either of the one or the other without adulteration.

The conquest of Senegal, and the retention of the French settlements on the coast of Africa, put an end to the iniquitous practice of the Dutch with respect to the gum trade, but what they suffered in that article they made up by more generally sophisticating their madder. It is not therefore to be wondered; that the culture of this plant soon became an object of public concern, for upon a moderate computation no less than 200,000l. a year has annually been paid to the Dutch, for a great number of years, for a root that was formerly one of the common productions of English agriculture, and which, it has been found upon experiment, may again be easily restored.

How this valuable article of English agriculture came to be lost has been the subject of national enquiry, and it has been discovered, that the frequent dif-

disputes between the clergy and the dairy about tythes, at length determined the English husbandman to forgo that branch of his employment rather than submit to the arbitrary impositions of his Rector, from whose oppressions he found he could get no relief by appealing to the courts of law. It remains, therefore, a question yet undecided, whether it is more owing to the rigour of the Clergy, or to the obstinacy of the farmer, that the Dutch have pocketed above twenty millions of English money for a drug, enough of which was not only raised at home for our own consumption, but an overplus for the supply of foreign markets.

To put a stop, however, to this drain of our national wealth, and to encourage the re-establishment of this profitable branch of agriculture, the legislature have passed a law to limit the tythe of madder to 5s. an acre for fourteen years to come, to commence from 1768.

From this encouragement, and that given by the Society of Arts for the same purpose, a considerable progress is already made in the knowledge of cultivating this plant; and by the curious observations and free communications of those who have engaged in its culture, others have been induced to embark in the same undertaking; insomuch, that many thousand weight of it have been raised in England within these few years, and it is imagined that in some future period, nearly as much will be raised as will be equal to our home consumption.

The measures pursued at first by the Society of Arts, tho' perfectly well intended, were not however, so judiciously directed as to produce any considerable effects. And, indeed, their first advertisements defeated, in a manner, the purposes for which they were drawn up; for by requiring 20,000 setts to be planted upon an acre, people were deterred
from

from engaging in a project, the expence of which was great, and the success doubtful. There were other unnecessary conditions annexed to their first Advertisement, which have been since, very judiciously, omitted.

A premium of 50*l.* offered in 1749, for the greatest number of acres, not less than ten, that should be planted with madder, and duly cultivated, was claimed and obtained in 1761.

From this period may be dated the restoration of madder as an appendage to British husbandry. From this period the Dutch began to take the alarm, and the States knowing the importance of it to the value of their lands, renewed their Edicts, forbidding under severe penalties, the least adulteration in that which was intended for exportation.

At first, one of the greatest impediments that obstructed the cultivation, was the difficulty of procuring a sufficient number of setts. The slow progress of raising madder from seed was very discouraging, and besides it was doubted, whether madder would thrive so well, or arrive at that perfection, if raised in England from seed, as from setts taken from plants in high vigour in the country where they were supposed to flourish the best.

As the premium that was offered, promised fair to reimburse a great part of the expence, some public spirited gentlemen found means to surmount this difficulty, and purchased setts at an extravagant price, with a view not only to supply their own present wants, but by propagating these, to be able to furnish other gentlemen, who might be inclined to embark in the same undertaking, at a more reasonable rate. At the same time, some nursery-men, allured by the hope of gain, exerted their skill in raising from seed; plants, which, if they succeeded, they knew would amply reward their labour; and if they did not, the mis-

miscarriage would be attended with no great loss. They were the rather induced to try the experiment, by considering, that whatever can be raised and brought to perfection in the climate of Holland, may be raised and brought to perfection with proper care and cultivation in the climate of England. Indeed it is not the climate, but the soil that is wanting to the propagation of madder. It has been observed, and I believe the observation to be just, that lands that are low, are generally more rich and fertile, deeper, and more abounding in vegetable food, than those that are higher; but that, notwithstanding this seeming advantage, the vegetable productions of the higher lands are more exalted in their nature, their juices more highly sublimed, and their virtues more powerfully impregnated, than those produced in impurer, tho' richer soils. The madder, we are speaking of, confirms the observation. The English madder, is found upon trial, to exceed in a very eminent degree, the madder of Holland. In that moist country, the crude watery part of the nourishment bears too great a proportion to the more exalted principles of plants, and tho' they thrive with wonderful luxuriance, yet they never come to that degree of excellence, which, by a due proportion of the nobler elements, they arrive at in drier soils.

The culture of madder, therefore, wants only to be perfectly understood, in order for that plant to be generally propagated in England. Whoever has been in Holland, must have observed, that their lands are naturally low and damp, abounding with salts and moisture; but that by a continual accession of soil from the higher countries, they are become deep, and full of that black rich mould, which Dr. Home has so highly commended. It is this, and this only, which makes the cultivation of madder the easiest, and at the same time the most profitable

part

part of husbandry in that country. Wherever their lands lie high enough to be secure from inundations, they cultivate their madder; for madder, tho' it delights in moisture, yet like other deep rooted plants, soon perishes in a watery bed. The greatest nicety of propagating madder, lies in suiting it to a proper soil, and whoever observes the above description, with the addition that follows, will never be at a loss to distinguish which that is.

One who calls himself a new cultivator has, in the *Museum Rusticum*, so particularly described the soil I mean, that I cannot better express it than in his own words. He says, "his first trial was upon a small piece of ground lying *pretty low and moist*, of a deep mellow soil, and rich black mould, a little inclining to sand, and underneath (about two feet and a half, and in some places three feet of good earth) was a bed of loose sand, with a mixture of gravel." This is the very identical soil in which madder will thrive in England; and tho' I have said, that in Holland they plant it upon their *high lands*, yet the nature of the two countries is so very opposite, that what may be termed a high situation in Holland, would here be deemed low; there are in Holland no high hills, and their most elevated situations, are such only, as to be exempted from the inundations that frequently overflow whole tracts of their ordinary lands.

It may not be improper to introduce what I have farther to say upon this article, with an observation of the ingenious author of *Essays on Husbandry*; "that in any country where there is *full consumption* on at home, the best use land can be put to, is to cultivate that crop whatever it be, which will produce the greatest profit valued in money;" that there is full consumption at home for any quantity of madder that can at present be raised, is most cer-

certain; and that a crop of madder will produce as great profit as any other, if rightly managed, will not be denied, so long, at least, as the laudable Society of Arts shall think fit to continue their well judged encouragement for the introduction and cultivation of it.

That Society has, at length, after mature consideration, settled a plan against which there can be no reasonable objection, as their premium is now established upon so general a footing, that it cannot be converted to serve the purposes of any one cultivator in preference to the rest, but all who engage in the same undertaking, must alike partake of the benefit.

That the readers of this treatise, may not be ignorant of the nature of this plan, it may be proper to inform them, that 500*l.* is appropriated yearly to be distributed in bounties of 5*l.* an acre, to all who claim it, provided the number of acres claimed for in any one year, does not amount to more than an hundred; if more, the 500*l.* is to be divided equally amongst the claimants, let the amount be what it may.

To this encouragement, I have now only to add directions for the cultivation of it, which, if duly followed, will probably render it equally profitable to the planter, and to the purchaser.

It were needless to repeat, what I have so often enforced, that in the cultivation of tap-rooted plants, the earth should be stirred as deep as the staple will allow, and there is no plant this climate can produce, that will pay better at present for additional labour, than madder.

As there is now a variety of ploughs, and other instruments, contrived for the purposes of trenching and plowing deep, gentlemen or farmers possessed of these instruments, may stir the ground at a very moderate expence, and that to any depth required; and those who have never heard of, or seen, such instruments,

ments; may, yet with the plows, &c. in common use perform a great deal. It is no uncommon practice for one plow to follow another in the same tract, with a view to deepen the tilth. Very little more is necessary in the preparation for madder in earth that is proper for it, except a frequent repetition of the same practice, in order to kill the weeds, and make the earth perfectly fine and mellow. Some rotten dung early laid on and frequently stirred, the better to mix and incorporate it with the soil, may be necessary, but it should be sparingly used; for madder abhors the rankness of dung.

When the ground is thoroughly prepared, by a summer's and winter's fallow, and by frequent stirrings is reduced to a perfect mellow tilth, then you are to lay it out in beds six feet wide, divided by intervals of two feet; which seem to be the most advantageous dimensions.

The spot of ground which I would recommend for a plantation, should be at least 40 acres; to be divided into *tens*, and to be planted successively till the whole is occupied. What I mean is, that ten acres only, should be planted the first year; ten more the second, ten the third, and the remaining ten the fourth; but I do not mean that any part of the thirty acres, unplanted with madder, should remain unemployed. Pease, beans, vetches, turneps, or any of the melliorating crops, may be raised preparative to madder.

This you will find to be far the most advantageous way of raising and continuing a plantation of madder, as by this means you will save the first cost of the plants, and after the first year, your ground may be so ordered as ever after to follow in succession; for after the plants have arrived to their full growth, upon the first planted beds, the ground may be trenched up with a trenching plow, and the fur-

rows filled up with rotten dung: In the spring following, this may be levelled and plowed in the ordinary way, to mix with the mould, and about the middle of June it may be again trenched, observing only that what was the bed before, should be the furrow now. In September, the earth should be stirred and levelled a third time, and about November trenched again for the winter; in which manner it should lie, till the second spring, when it should be levelled for planting, then when it is levelled and harrowed smooth, a kind of drill-plow should draw the furrows as before, and the setts being fresh upon the spot, should be slipt, laid in the ground and covered, as will be hereafter directed. In this manner, by following every division one year in four, your plantation may be continued for ten, twenty, or thirty years, without impairing the soil, or diminishing your crop of madder; on the contrary, if the madder likes the soil, it will be much increased.

The time of planting, is from the middle of April, to latter end of May. If the weather be warm and moist, the earliest period is the best; and this should be particularly attended to, as the plants will then strike root, and few or none of them fail; whereas, if the weather be dry, or the nights frosty, they are very apt to die.

Before you begin to plant, the beds should be raised a little with the mould from the trenches; but this mould should not be dug above half a spade deep at first, as some will be required every year to cover the haulm before winter.

Every thing being now ready relative to your ground, your plants are to be procured; and herein the great difficulty lies at first; afterwards, as has been said, when you have raised a plantation of madder, you will not only have enough for your own use, but to spare.

If

If your plants are to be brought from any considerable distance, a kind of vessels like milking-pails should be procured, into which the plants should be set quite upright, with a little moistened earth at bottom, and so as to fill the cavity of the vessels lightly without squeezing; if these vessels have covers with holes bored through them, they may be carried in waggons or carts to almost any distance, without injuring the plants. Those who are accustomed to raise artichokes, know well how to slip the setts, which is nearly the same as slipping artichokes, but much easier.

Having procured your plants, let the beds intended for planting, be fresh raked, and then having a sufficient number of hands ready, proceed to planting; this is best performed with a dibble across the bed, where men are accustomed to that kind of planting; but where they are not, the readiest way is, to draw a deep furrow with a drill plough, the whole length of the plantation, as near the edge of the bed as possible; another about fifteen inches distant from that, making four furrows in each bed, and then laying down the plants as upright as may be in the furrows, about twelve inches distant from each other, cover them up with a hoe, leaving the tops of the plants just uncovered. This done, rake the bed smooth, and proceed in the same manner, till your whole plantation is completed. Nothing more is necessary to be done, except weeding, till autumn, and then with a very light wooden roller, drawn by one man, the haulm, after being turned inwards with forks, may be pressed flat upon the beds, and with mould from the trenches, covered about two inches thick. Those who are accustomed to the culture, of asparagus will be at no loss to understand, what is here directed with regard to Maddar. In this manner your Maddar may lie the winter, and when in the spring the weeds begin to appear,

pear, they must be carefully hoed out. If the weeds were pulled out the preceding summer, very slender weedings will suffice during the remainder of your Madder's growth; but you must carefully repeat the second autumn, the same you performed the first; and after the third your roots will be fit to gather.

Indeed where Madder is planted in the spring, on a soil which it naturally likes, it will be fit to gather after the second autumn, if the seasons have been favourable. The proper time to dig up the roots is, when they are grown to the size of a large tobacco-pipe, and the manner of doing this is different in different situations. Where men's labour is dear, digging them up with the spade, as Mr. Miller has directed, is too expensive; and, indeed, where the plantations are extensive, digging could not be performed in any reasonable time. Ploughs have, therefore, been contrived on purpose to loosen the earth in the rows, and women and children employed to pull up the roots, and to clean them.

In the Low Countries, much of the field labour is done by women, at which they are very expert, and perform it with more dispatch than the men. They afterwards plough the beds deep, throwing the mould on both sides into the trenches, and leaving a henten in the middle. Children follow the plough, and pick up the smaller fibres, and broken parts of the roots, which the first gatherers have left behind; and lastly, they harrow with long crooked tined harrows, and collect what remains into little heaps, as we do couch-grass.

Having in this manner cleared the ground, they fit it afresh for a second crop of Madder, after which they convert it into corn or grass, and do not plant Madder upon it for several years after. For the second

cond crop they change the arrangement of the beds; that part which was the trench during the first crop is filled up, and made the middle of the bed for the second. By which method they think the land is more equally occupied.

When the roots are taken up, they are cleansed as much as shaking will cleanse them from dirt, and dried as much as can be in the air, and then carried to the kilns and dried; and lastly, to the mills and ground. For which purpose they have kilns of a particular construction, and mills too.

Mr. Miller has given a still more particular account of the whole process, as practised in Zealand, with the substance of which I shall conclude this article. He tells us, and his account seems authentic, "that in Schowen, one of the islands of Zealand, where the best Madder is now raised, they prepare their land, if it be strong and heavy, by plowing it twice in the autumn, and once in the spring; if it be light, twice only in the spring. In both cases the land the last time of plowing is divided into three feet ridges with furrows between them of a proper depth. There, he says, a gomet of land (equal to three-fourths of our acre nearly) will yield from 1000 to 3000 lb. weight, according to the goodness of the land, and the favourableness of the season.

The time of planting in that country begins about the latter end of April, continues all May, and in cold seasons far into June. The young shoots are taken off from the mother plants with as much root as possible, are planted in rows with a dibble across the ridges, commonly four plants in a row, and the rows about twelve inches distant from one another. The price of slips differs in different years; some years the number for planting a gomet will cost from 30 to 40 s. sterling, other years from five to six pounds.

pounds. The dibbling a gemet costs from 30 to 40 shillings, according as the land is heavy or light, raking 4s. and slipping the shoots about five shillings. The first year, they either plant cabbages or kidney-beans between the rows, and that costs two and twenty shillings a gemet. In September or October, the green haulm is carefully spread over the ridges, and in November it is covered either with the plough or the spade, to the depth of three or four inches; if with the former, it costs five or six shillings; if with the latter, from 16 to 20 shillings.

The second year the ridges are scuffed over about the beginning of April, to check the weeds, and loosen the earth to facilitate the growth of the young shoots, and this costs about three shillings the gemet. The summer of this year nothing is suffered to grow between the rows; but the whole plantation is kept perfectly clean and neat, like a garden; in the autumn and winter the same as before. The roots are seldom dug up the second year, therefore the culture of the third year is exactly the same as that of the second; only this last year, the shoots that are slipt for transplantation may be more numerous than those of the preceding year.

Before the first of September it is forbidden to dig up the Madder in this island; but on that day a beginning is made, and he that is most alert, and gets the first cart load to the stove gains a premium of three ducats. The digging up the Madder, costs from four pounds sterling to ten a gemet; according to the nature of the land, or the lightness or heaviness of the crop.

When the Madder is dug out of the ground, it is carried to the stove, and there laid in separate parcels, and each man's parcel ticketed; and as it cannot all be manufactured together, *first come, first served*, unless several happen to come at the same time, and then

they draw lots. The Madder that is carried over night is next morning hoisted up to the uppermost story of the stove, and there spread to dry for the space of one and twenty hours, after which that parcel which occupied the warmest part of the stove is removed to the coolest, and that which occupied the coolest removed to the warmest; still, however, observing to shift the parcels according to their tickets, that every man may have his own. This is continued for four or five days till the Madder is sufficiently dried to thresh, and then it is brought to the threshing-floor, where the outer coats and dirt being beaten off, it is carried to the kiln, and there spread upon a hair-cloth to dry. From the kiln it is carried to the pounding-house, which, according to the account in Miller, is all one with the mill, and there it is pounded, sifted, and put up in casks. It is then in Zealand carried to Asflayers, where it is properly marked, according to its goodness, and then sealed. Their nicety in this article has gained them great credit, inasmuch that the Madder marked with the arms of the city of Zealand is preferred all over Germany, and first purchased in all the markets in Europe."

I have only to observe on this account, that tho' the cultivation of Madder is chiefly in the hands of the gardeners, yet it is by no means so nicely performed in that country, as the same kind of work is in our gardens about London. It is only the apparatus that is wanting here of stoves, threshing-floors, kilns, and pounding-houses, in order to the due manufacturing of Madder, otherwise our gardeners, nay, our common farmers would soon excel in the art of cultivation. Indeed as it has of late been discovered, that English green Madder will go proportionably much farther than the best Dutch dried

dried Madder, though ever so nicely prepared, there is reason to hope that some method will be discovered to preserve the Madder in that state; and that our manufacturers will give encouragement to the growers, by purchasing whatever is offered to sale at the full price, by which in the end they will be considerable gainers.

It should, however, be a caution to those who undertake the cultivation of Madder, not to attempt it upon improper ground. If the soil be properly chosen, any man accustomed to the cultivation of land, who will take the pains to prepare it, lay it out, and plant it, and afterwards dress it in the manner I have directed, cannot fail of making a fortune.

The bounty that the society allows, will more than pay the workmen for planting and all the additional expence more than for ordinary crops besides; and till very large plantations shall render stoves, &c. necessary, small quantities may be very well manufactured, (supposing the convenience of disposing of the Madder green not always to be obtained) in our common hop or malting kilns, threshing-floors, ovens, and horse-mills.

Forty acres of land laid out in *tens*, as I have directed, would employ two men constantly in the summer to hoe and keep them clean; ten of these acres would after the first four years come annually in succession. No. 1. of the first year's planting would be ready to gather the same year that No. 3. was planted; No. 1. therefore, may be fallowed and dressed two winters and one summer, and after that come again in rotation with Madder. No. 2. the same, and so on, still having a succession of roots of three years growth upon every ten acres, which at 50l. an acre being the average price at which an acre of good Madder has been estimated, amounts

with the additional bounty to 550l. a-year. The expence of which, after the whole has been once planted, will not amount to more than 60l. Here then is an annual profit of at least 300l. upon 40 acres of land, reckoning 40 shillings an acre for the rent of it. I am persuaded, however, that the planting of Maddar is no such tedious business, was it rightly understood, as is commonly supposed. When men shall become expert at it, two of them may be taught to follow the plough, and place the plants at a proper distance in the furrow by their eye, so that the plough may cover the plants at the second bout, which were so placed by the planters in the furrow of the first.

Two men, one to go up and the other down, would plant as fast as the team could plow; and as every third furrow only should be planted, while the plough was drawing the two vacant furrows, the men with proper instruments might dress the plants and smooth the ground about them, so as to lie nearly as near, as if planted with a dibble; nay, this method of planting seems to me preferable to every other, and nothing more is wanting to introduce it than to contrive that the horses instead of walking in the furrow, by which the plants might be disordered, should walk by the side, and that they might alternately be changed, so as to go on the right-hand or left. I say, preferable to every other, because by this method the ground is not trodden as by dibbling, and every part of the root is lightly covered with no other pressure than is just necessary, and no vacancy is left as by dibbling.

C H A P. XXX.

Of Liquorice.

A VERY sensible writer has observed, "That
 "Liquorice requires four distinct properties
 "in the soil that is perfectly agreeable to it. 1.
 "Depth, through which it may descend; 2. *Light-*
 "ness, that it may not be impeded in the progress;
 "3. *Warmth*, to promote its growth; and 4. *Rich-*
 "ness, to supply it with nourishment." There are
 many spots of earth in England that have all these
 properties combined; for wherever there is depth
 enough in the rich sandy soils, the company of the
 rest is never wanting.

Liquorice is now more generally raised in Eng-
 land and in Scotland too than formerly. It was the
 general notion that it would grow but in few places,
 and those who were in possession of it were not want-
 ing to confirm that vulgar prejudice. I have, how-
 ever, been credibly informed, that there is hardly a
 physic garden, or a garden of any curiosity, from one
 end of the island to the other in which it is not cul-
 tivated.

It has not, indeed, obtained a place in the field
 culture of but few places; and in those, it is like
 saffron, in the hands of a certain number of families,
 who just make a living by occupying little parcels of
 land of their own, or renting others at a dear rate.
 The Liquorice plant differs but little in the man-
 ner of its growth from the Madder plant; but it
 grows larger, and its root is smoother; both require
 the same depth of soil; both shoot forth runners;
 and both are planted about the same time, and in
 nearly the same method.

The

The ground for the Liquorice is double trenched; at Pomfret in Yorkshire where the greatest quantity is raised, they have yet invented no new instrument for this purpose, but perform all with the spade; their soil is a rich sand of uncommon depth, easily worked, and by a continual accession of manure, they keep it in constant heart.

In forming a new plantation their way is to open the fresh ground early in autumn, to trench it from two to two feet and a half deep, casting up the earth from the bottom, and burying that which was a-top; and filling the hollows between the ridges with well-rotted dung, they expose all to the vicissitudes of the winter's weather. Early in the spring, they begin digging a full spade deep to mix the dung and the mould together, and to bury the weeds, if any have sprung up. In this condition the ground remains till towards the latter end of February, and then they renew their trenching, by throwing the mould to the top that was buried before, and that to the bottom which was enriched with the dung; and lastly they cover all with a sprinkling of lime.

Sometime in March they prepare for planting, by procuring setts from the best adjoining plantations; these are always to be had, but not always at the same price; that varies according to the demand. Their setts are of two kinds, those that are split from the tops of the roots are called *Crowns*; those that are cut from the lateral strings are called *Runners*; these last spread along the surface horizontally at the depth of about two inches, and are taken up and cut into setts of five or six inches long, with each three eyes; and each string will make from twelve to sixteen setts. It is generally allowed, that from 80 to 90,000 setts are planted on an acre, of which 24,000 should be crowns.

Being

Being provided with fetts, they level their trenches and cover in the lime, rake the ground perfectly smooth and fine, and then strike out their beds of the breadth of 3 feet, and of a length proportioned to the ground they have to plant. This they do in pairs by means of two lines; one man runs along with the reel of one line and the peg of the other, to the extremity of the lines, and then with a gage fixes them answerable to those at the opposite end. Then both the men placing themselves on the out-side of the lines, proceed to move side-wise, treading the ground smooth parallel to the lines, and passing one another in the middle, arrive each at opposite ends at the same time, and then moving their lines again by the same gage, proceed in the same manner till all the beds are completed.

The ground thus laid out assumes the appearance of a well-cultivated garden, and the alleys between the beds serve for the purposes of planting, weeding, and covering the fetts, without treading down the earth in the beds.

The beds being thus completed, the planters place their fetts in bundles at each end of the beds, and taking a certain number in their aprons, proceed by first moving their lines as before, and placing them just six inches within the beds, they begin planting the fetts like pricking out cabbages, about six inches apart, only that they bury the fett about an inch under ground. When the sides of one bed is planted, they move the lines to the sides of the next, and so proceed till the sides of all the beds are planted with *Runners*.

When the sides of the beds are completed, they next move the lines to the middle of the beds, and each man taking a separate bed, they proceed to plant the *Crowns* in like manner as they planted the *Runners*,

Runners, only allowing a little more space between each. These being all planted, their next business, is, to deepen the alleys, and to trim the beds. This they do very dexterously by sloping down the sides, and throwing the mould lightly over the beds, and then rounding them up, they lay them like well-dressed beds of asparagus. Being thus completed, they sometimes sow onions, spinach, or some such fibrous rooted plants of quick summer's growth, as the Liquorice makes but a slow progress for the first year. The profit of these pays for the weeding; for great care must be taken to destroy the weeds.

When winter approaches, and before the frosts begin to set in, they clip off the green tops of the Liquorice the first year, but afterwards they mow them off as they do grass with a scythe.

The second and third years they slip off the crowns and runners at the proper season; the first of which they sell at the rate of five shillings a thousand, the latter at about three shillings.

About the autumn of the third year, they begin taking the Liquorice out of the ground; this they do by digging a deep trench on the out-side of the plantation, and working backwards. By this method, they trench up the ground for a second plantation at the same time that they dig up the roots of the first. In this operation men, women, and children are employed; the men in digging, the women and children in picking up and sorting out the Liquorice. Some defer the taking up the Liquorice till the March or April following for the sake of the setts. But it has been discovered, that the Liquorice is hurt by this delay, and that the best season for taking it up is, when the sap is in the root.

Of the small sprays, the black cakes, known by the name of Spanish Liquorice, are made, they are mashed; mixed with a proportionable quantity of water,

water, and boiled to a consistence in an iron pot; or they are ground to powder, and sold to the apothecaries.

The large roots are made up in bundles, and laid up in sand till a proper market is found for them, which is seldom long wanting. No root is more saleable.

The crowns and runners are sometimes transported to great distances, in order to form new plantations. They will keep good in sand the longest voyages; a layer of sand, and a layer of plants is the usual method of transporting them.

Great profit is said to arise from the culture of this plant where the soil suits it, and yet few of the planters are rich. Indeed, it is seldom that one planter has many acres of it in tillage.

THE CONCLUSION.

AFTER most of these sheets had passed the press, a second volume of *Memoirs of Agriculture* came out by Mr. Dossie, under the sanction of the Society for the Encouragement of Arts, some of the contents of which tend to confirm facts already known, and others to direct to new improvements. With an epitome of these, so far as they relate to field cultivation, I shall conclude the present work.

The first that occurs, is an improvement in the culture of Lucern by Mr. Bakhwin, of Clapham in Surry, who seems to have invented two instruments, by the use of which drilled and transplanted Lucern may now be kept clean at a moderate expence; the first is a horse-hoe, composed of harrow-tines and small hoes, disposed in such a manner as to work steadily even in stoney ground; the others a hoe-plough, that by working up and down the rows, stirs the earth in the intervals without annoying the plants, and

and throws up such tap-rooted weeds as the horse-hoe leaves behind. This gentleman has likewise pointed out the proper distance for regulating the rows, which he has determined to be 20 inches, for two reasons ; First, Because that space is fully sufficient to supply tap-rooted plants with nourishment ; and secondly, Because in that space a horse may be conveniently introduced both to hoe and plow. He has also discovered, that Lucern, though it may thrive well for two or three years, in soils that are wet, yet when its roots have penetrated much below the staple, it always decays, which tends to confirm what I have before advanced, that in moisture without heat no plant will live.

Mr. Baldwin's directions for cleaning broad-cast Lucern, deserve the greatest attention. He advises at every cutting, to cart the new-mowed grass to another field, and immediately to apply the harrow while the ground is yet loose and moist, and the weeds weak and shallow-rooted ; also after frosts, while the ground is yet hollow and the weeds loosened ; at all which critical times, it is most certain, that weeds may be more copiously removed, than when the ground is hard and stubborn and the weeds more firmly fixed.

The result of Mr. Reynold's farther experiments on the culture of the Turnep-rooted Cabbage, is likewise an article, according to Mr. Dossie's account, worthy of the highest regard. He has discovered, that a constant succession of this useful plant may be obtained throughout the year, so that farmers need never be at a loss for a supply of green winter food for their cattle, who will take but moderate pains to procure it. During the summer months, let but a quantity of the seed, proportioned to the spot intended to be planted, be sown on any ordinary bed of earth five weeks before the ground is in
readiness

readiness to receive the plants, (two ounces to an acre will be sufficient) and all that is afterwards to be done, is, to dibble the plants out in rows, two feet asunder, like common cabbages, and when the weeds begin to grow to any height, run a plough thro' the rows to loosen the ground and dislodge the weeds. These easy operations may be repeated, month after month, till as many acres are employed as may be supposed to maintain the number of neat cattle and sheep that the farmer has in stock, for a longer or shorter time, as he may think proper. If the soil on which the plantation is made be rich, deep ploughing without manure will answer the purpose. If poor, some manure will be necessary. Three acres of this plant kept a flock of 390 sheep two and thirty days, without fodder. It is, however, a fact that ought not to be concealed, that some who have made trial of this plant in the neighbourhood of Bromley have found it not worth continuing.

Mr. Reynolds has likewise recommended a steep for the preservation of wheat from the smut, which, though I own myself no great friend to steeps, may yet be tried at a small expence, and used without fear of any pernicious effects. His manner of making it, is, by mixing a corn bushel-full of stone-lime, heaped, with seventy gallons of water, letting it stand thirty-six hours to dissolve, and afterwards running off the liquor in the manner of clear wort; to this liquor he adds three pecks of salt, and when that is dissolved, he brines his seed wheat in the common manner, taking care to skim off all the floating grain, and when the heavy seed is well cleansed, taking it out and immersing more. After this operation he uses no lime, but lets his seed lie upon a dry floor to drain till it is fit to sow. By the omission of lime, however, I cannot help thinking one great advantage is lost, and that is, preserving the
grain

grain from being consumed by vermin, for while it remains candied with lime, no grub or other insect will touch it.

Mr. Reynolds does not seem to confine his improvements to field culture only; he has extended them to the garden, and has discovered a method of raising melons without earth, dung, or water. He prepares a bed of cast tanner's bark in the usual manner, suffers it to heat, and then buries his seeds, after infusing them in warm milk, thirty-six hours in the bed, to dispose them the more readily to vegetation. He then prepares a number of holes in proportion to the frames he has to cover them, and having a quantity of pounded bark ready prepared, fills every hole with it, three inches high, on which he places his seeds, pressing them down with his finger, and covering them with the same pounded bark to the height of two inches; the holes, he says, should be five inches deep, and seven in diameter. He carefully covers his plants from cold, and admits as much warm air to them as possible; he never waters them, or suffers the rain to enter his beds, or uses any other but the common management to increase their growth, except what is above directed. The time of preparing his beds for family use, he limits to March, and it should seem that his pounded bark is of the same quality with that of his beds, or he would have directed to have used it fresh.

But one of the most valuable articles in this second volume of *Memoirs* is the account of a new species of Potatoe, to which the Editor has given the familiar name of the Bedfordshire Potatoe, tho', I think, it might with more propriety, have been called the American Potatoe. Two specimens of this new species were sent to the Society of Arts by two gentlemen about the same time, one from Northumberland, the other from Bedfordshire; that from Northumberland, was observed by a gentleman of fortune in
that

that county to be cultivated among his tenants, who could give no other account of the origin, but that some of the roots were supposed to be picked up on the sea coast, and to have been cast ashore from the wreck of some foreign ship that had been stranded near the place where they were found. The other specimen was communicated by John Howard, Esq; of Cardington in Bedfordshire, who procured half a dozen roots from a person near Bristol who had imported them from America. With these, properly cultivated, in two years time, he raised a waggon load, and caused it to be made known, that whoever chose to propagate them, might be furnished gratis with whatever quantity they wanted for that purpose. Many persons applied, and all who made the trial, found the increase to exceed their expectation.

They are an irregular shaped Potatoe, knobby, and more like a cluster of Potatoes growing together than one single root. In rich soils where they are allowed room, they grow to a vast magnitude, but in common earth, where they are set at the usual distance, their size is from half a pound to a pound, and it is observable, that they grow closer to the stems, and are more of a size than the common Potatoe; from twenty to thirty, is the usual increase from a single cutting. Mr. Howard has confirmed, what I had before observed, that Potatoes thrive better from cuttings of large roots, than from small Potatoes planted whole. Upon enquiring at London concerning the general estimation in which this new species of Potatoe is held among the gardeners, my seedsmen informed me; that there being no demand for them after the first season, the gardeners had neglected to raise them. He said, they eat sweet, and differed as much in their taste from the common Potatoe, as in their figure.

There seems to be no other difference in the manner of planting these from that of the ordinary Potatoe,

too, but that of allowing them a little more room. Mr. Howard planted his in rows, with three feet intervals, and three feet between the cuttings; but the readiest and cheapest way of planting and gathering Potatoes is now found to be, to drop the cuttings after the plough upon moderately light and well prepared land, about eighteen inches a-part, and when the proper season arrives, to plough them up again, and gather them after the plough with four-pronged forks, bent downwards, after the manner of tailing dung forks.

There are in the before-mentioned volume other articles of less moment relative to husbandry, which, nevertheless, have been judged of importance enough to merit the approbation of the honourable Society for the Encouragement of Arts; particularly some experiments for procuring a crop of Turneps without interrupting the ordinary course of cropping. These experiments shew, that by sowing Turneps in the intervals of horse-hoed beans, a month or more before the usual time of pulling, the seed may be covered by the last hoeing of the beans, and the plants conveniently hoed after the beans has been pulled and set on end; that this practice may be pursued with less hazard from the fly than the common method; and, that when the Turneps are eaten off early in the spring, Wheat may be then sowed for a harvest crop.—Practices of this kind are not new in the garden-culture; but the land must be very rich, indeed, where they can be introduced with advantage in common fields, and I would advise my young farmer to content himself with one good crop from his land in one year, without greedily seeking for more, lest by some fatality in the pursuit, a disappointment should ensue, and he should experience the judgment threatened by the Adage, *ALL COVET, ALL LOSE.*

••• F I N I S.

